

# **Exhibit 1**

**PROFESSIONAL SERVICES AGREEMENT**

THIS PROFESSIONAL SERVICES AGREEMENT (the "Agreement") is made this 31 day of December, 2009 by and between New Castle County ("County"), and **PB Americas, Inc.** ("Consultant") located at 100 South Charles Street, Tower 1, 10<sup>th</sup> Floor, Baltimore, MD 21201-2727.

**WITNESSETH:**

WHEREAS, the County desires to employ the Consultant to furnish planning, design, and construction inspection and management services to rehabilitate, replace, and upgrade the Governor Printz and Old Governor Printz Interceptors and related facilities within the Brandywine Hundred Sewer Basin (06P-013); and

WHEREAS, the Consultant submitted a proposal for the procurement of professional services and was selected by the County, and where the probable cost of such services is estimated to exceed Fifty Thousand Dollars (\$50,000.00), or where the provisions of New Castle County Code Section 2.03.103.C are invoked, such selection was consistent with Delaware Code Subchapter VI, Chapter 69, Title 29 and Section 2.05.502(B) of the New Castle County Code.

NOW, THEREFORE, for good and valuable consideration the sufficiency of which is hereby acknowledged, and intending to be legally bound, the County and the Consultant agree as follows:

**1. Agreement to Provide Professional Services**

The County hereby engages the Consultant, and the Consultant hereby agrees, to perform all services (the "Services") necessary and appropriate to complete the tasks defined and set out in the Consultant's Proposal dated October 28, 2009 (the "Consultant's Proposal") which is attached hereto as Exhibit A and incorporated herein by reference.

**2. Fees and Payment**

(a) The cost of the Services shall be billed on a **time and material** basis, with the overall contract cost not to exceed \$ 2,422,933.00 as set forth in the payment section of the Consultant's Proposal (hereinafter, the "Payment Schedule").

(b) For Services performed on a time and materials basis:

(i) No overtime or increased rates shall be paid unless specifically authorized by the County in writing in advance; and

(ii) In the event that the Consultant shall assign personnel to the project who do not fall within the categories set forth in the Payment Schedule, the County and the Consultant shall mutually agree on the billable rates for such personnel in writing.

(c) Unless other payment terms are specified in the Payment Schedule, the Consultant shall invoice the County on a monthly basis: (i) for Services provided on a time and materials basis and for out-of-pocket costs and expenses, monthly in arrears; or (ii) as otherwise provided in the Payment Schedule. Payment to the Consultant shall be made within sixty (60) days following the County's receipt of such invoice.

(d) The County does not have the obligation to pay the portion of any invoice which is disputed (in whole or in part) by the County in good faith until the dispute is resolved. In the event that any disputed invoices are outstanding, the Consultant shall nevertheless be obligated to continue its Services hereunder without interruption and the parties hereto in good faith shall attempt to resolve their dispute. Notwithstanding anything to the contrary in the Consultant's Proposal, the County shall have no obligation to pay service charges or interest on late or disputed invoices.

(e) At the County's request, the Consultant shall execute a truth-in-negotiation certificate stating that the wage rates and other factual unit costs contained in the Payment Schedule are accurate, complete and current as of the date of this Agreement.

(f) Upon satisfactory completion of the Services performed hereunder, and prior to final payment under this Agreement for such Services, or prior settlement upon termination of this Agreement, and as a condition precedent thereto, the Consultant shall execute and deliver to the County a release of all claims against the County arising under or by virtue of this Agreement.

### 3. Reimbursable Expenses.

(a) The County will reimburse the Consultant for the following actual out-of-pocket expenses incurred by the Consultant:

(i) Costs and expenses incurred with the reproduction of drawings, specifications and other documents required to be delivered by the Consultant to the County and others hereunder to the extent that the aggregate amount thereof exceeds Two Hundred and Fifty Dollars (\$250.00) (excluding, however, reproductions for in-house use of the Consultant);

(ii) Special postage, delivery and handling costs; and

(iii) Fees, if any, for securing approvals of governmental authorities having jurisdiction.

(b) Such expenses shall be necessary and properly incurred by the Consultant in connection with the Services. The Consultant shall provide receipts or other accounts of records as may be requested by the County. The Consultant shall submit its invoices on a monthly basis for reimbursement as part of the payment requests referenced in Section 2(c).

(c) Unless given prior written authorization by the County, the County will not reimburse the Consultant for expenses such as travel expenses, computer time, reference

books and special equipment or for any payments made for the services (including secretarial) of other persons to assist the Consultant in the provision of Services.

4. Responsibility of the Consultant

(a) The Consultant shall: (i) possess the expertise, capability, equipment and personnel to perform properly and professionally the Services hereunder and (ii) be and remain properly and legally licensed to perform such Services.

(b) The Consultant shall be responsible for the professional quality, technical accuracy, timely completion, and the coordination of all designs, drawings, specifications, reports, and other services furnished by the Consultant under this Agreement. The Consultant shall, without additional compensation, correct or revise any errors, omissions or other deficiencies in its designs, drawings, specifications, reports and other services and reimburse the County for costs related to, or caused by, such incorrect or defective work, including, but not limited to, replacement of incorrect or defective material and equipment, removal and reinstallation costs.

(c) Approval by the County of drawings, designs, specifications, reports and incidental engineering work or materials furnished hereunder shall not in any way relieve the Consultant of responsibility for the technical adequacy of its work.

(d) The Consultant shall be and remain liable in accordance with applicable law for all damages to the County caused by the Consultant's negligent performance of any of the Services furnished under this Agreement.

(e) The Consultant shall keep himself fully informed and apprised of all Federal, State and local laws, ordinances, regulations, orders and decrees which in any manner affect those engaged or employed on the work or which in any way affect the execution of its work. The Consultant shall at all times observe and comply with all such laws, ordinances, regulations, orders, and decrees and shall immediately notify the County of any conduct on such Consultant's part which may be in violation of any such laws, ordinances, regulations, orders or decrees.

(f) The Consultant, while performing Services under this Agreement, shall conduct its public dealings in a courteous and professional manner and any employee whose conduct reflects adversely on the County shall be removed from further involvement with the project. When such a removal is warranted, the County will so advise the Consultant and substantiate the causes for said removal.

(g) The Consultant shall maintain all required licenses, pay all taxes, pay all related fees and charges and give all notices necessary and incidental to the due and lawful prosecution of the work.

(h) In the event that the Consultant, its successors, assigns, employees, contractors, subcontractors, agents, and representatives, enters County property (including but not limited to County easements), the Consultant shall repair any damage at its sole cost and expense caused by the Consultant to any property entered on by the Consultant to the extent such

damage was caused by the Consultant. The Consultant agrees to indemnify, defend and hold the County, its officers, directors, employees, agents, licensees, contractors, guests and invitees and the property owner (in the case of a County easement or other partial property interest) harmless from any and all liability, claims, demands, liens, damages, penalties, fines, interest, costs and expenses that arose from, were caused by or were related to the Consultant's entry or work on County property or easements (including, without limitation, fees and charges of attorneys and other professionals and court costs).

(i) The Consultant shall perform all Services contemplated by this Agreement by the best and soundest means and methods and in the most expeditious and economical manner consistent with the interests of the County and consistent with its standard of care set forth below. The Consultant represents that its Services shall be performed in a manner consistent with the level of skill and care exercised by other members of the same profession currently practicing in the same locality under similar conditions.

#### **5. Insurance Requirements**

(a) The Consultant will be required to provide insurance of the prescribed types and minimum amounts as set forth below:

(i) Comprehensive General Liability coverage, including contractual liability, with a limit of not less than One Million Dollars (\$1,000,000.00) for loss or damage to property in any one occurrence and Bodily Injury Liability with a limit of not less than One Million Dollars (\$1,000,000.00). There is to be a waiver of subrogation endorsement included in favor of the County to the full extent permitted by law. The County should be specifically named as an additional Insured on the said policy and Certificate.

(ii) Automobile liability insurance covering owned, non-owned and hired vehicles used by the Consultant for the Services with a limit of not less than One Million Dollars (\$1,000,000.00) for each occurrence. There is to be a waiver of subrogation endorsement included in favor of the County to the full extent permitted by law. The County should be specifically named as an additional Insured on the said policy and Certificate.

(iii) Workers' Compensation Insurance, including Occupational Disease, which shall comply with the Laws of the State of Delaware and Employer's Liability Insurance in an amount not less than One Million Dollars (\$1,000,000.00) per person/per accident.

(iv) Professional Liability Insurance with a limit of liability in an amount not less than Five Million Dollars (\$5,000,000.00) with not more than a One Hundred Thousand Dollars (\$100,000.00) deductible insuring the Consultant and its officers, directors, stockholders, members, employees, consultants and partners, and all other persons for whose acts they or any of them may be liable, against any and all liabilities arising out of, or in connection with, the negligent acts, errors or omissions of any of the foregoing in connection with the carrying out of its professional responsibilities in providing the Services. If this insurance is written on a claims made form, and if there is a retroactive date, then the date must be prior to the inception date of any work under this Agreement; and that same retroactive date must be

maintained unchanged during the term of the Agreement, and for at least three (3) years thereafter.

(b) All required insurance shall be maintained with insurance carriers licensed or approved to do business in the State of Delaware and approved by the County. All insurance companies are to be rated by Best's at least A- and are subject to approval of the County.

(c) Upon execution of this Agreement, the Consultant shall furnish a Certificate of Insurance (the "Certificate") to the County evidencing the insurance required hereunder. Upon request, true copies of the actual policies shall be furnished. Each such Certificate shall name as Insured the Consultant and as additional insured the County (except Workers' Compensation and Professional), as their interest may appear, and shall provide that thirty (30) days prior written notice shall be given to the County in the event of cancellation or material change in the policies of insurance discussed hereunder. All premiums shall be paid in full by the Consultant.

(d) The insurance policies required by this Agreement shall be kept in full force and effect as follows:

(i) All insurance required under Section 5(a)(i), 5(a)(ii) and 5(a)(iii) shall be kept in full force and effect during the performance of this Agreement and until the Consultant has fully performed all Services hereunder to the County's satisfaction; and

(ii) Professional Liability Insurance pursuant to Section 5(a)(iv) hereof shall be kept in force during the performance of this Agreement and for three (3) years after the completion of all work if on a claims made form (if on an occurrence form then Section 5(d)(i) applies).

(e) In the event that the Consultant hires or subcontracts with another entity ("Subcontractor"), the Consultant shall be responsible for ensuring that the subcontractor or agent maintains the levels and types of insurance outlined above, and the Consultant shall be responsible for obtaining an insurance certificate from the Subcontractor which includes the levels and types of insurance coverage outlined above and which names the County as an additional insured (except Workers' Compensation and Professional). The Consultant shall furnish such certificate to the County prior to the Subcontractor's entry onto County property (including but not limited to County easements).

(f) All equipment, materials and supplies belonging to the Consultant or its Subcontractor shall be brought to and kept at the construction area at the Consultant's or Subcontractor's sole cost, risk and expense, and the County shall not be liable for any loss or damage thereto. Any insurance policies maintained by the Consultant or Subcontractor on such equipment, materials or supplies shall provide for a waiver of underwriter's right of subrogation against the County.

6. Changes

(a) The County may, at any time, by written order, make changes within the general scope of this Agreement in the Services to be performed. If such changes cause an increase or decrease in the Consultant's cost of, or time required for, performance of any Services under this Agreement, whether or not changed by any order, an equitable adjustment shall be made and this Agreement shall be modified in writing accordingly. Any claim of the Consultant for adjustment under this clause must be asserted in writing within thirty (30) days from the date of receipt by the Consultant of the notification of change unless the County grants a further period of time, in writing, before the date of final payment under this Agreement.

(b) No services for which an additional compensation will be charged by the Consultant shall be furnished without the written authorization of the County.

#### 7. Termination

(a) This Agreement may be terminated in whole or in part in writing by either party in the event of a material failure by the other party to fulfill its obligations under this Agreement through no fault of the terminating party: PROVIDED, that no such termination may be effected unless the other party is given: (1) not less than ten (10) calendar days written notice (delivered by certified mail, return receipt requested) of intent to terminate; (2) an opportunity for consultation with the terminating party prior to termination; and (3) a right to cure, within ten (10) calendar days from the receipt of notice of termination.

(b) The County may terminate this Agreement in whole or in part at any time and without cause by providing the Consultant thirty (30) calendar days written notice (delivered by certified mail/return receipt requested) of intent to terminate.

(c) The equitable adjustment for any termination shall provide for payment to the Consultant for Services rendered and expenses incurred but no amount shall be allowed for anticipated profit on unperformed services or other work. If termination for default is effected by the County, an equitable adjustment in the price provided for in this Agreement shall be made, but any payment due to the Consultant at the time of termination may be adjusted to the extent of any additional costs occasioned to the County by reason of the Consultant's default.

(d) Upon receipt of a termination action pursuant to paragraphs (a) or (b) above, the Consultant shall: (1) promptly discontinue all services affected (unless the notice directs otherwise), and (2) deliver or otherwise make available to the County all data, drawings, specifications, reports, estimates, summaries, and such other information and materials as may have been accumulated by the Consultant in performing this Agreement, whether completed or in process.

(e) Upon termination, the County may take over the work and prosecute the same to completion by agreement with another party or otherwise. The County will not hold the Consultant responsible for any subsequent work performed by the County which is not based on the Consultant's original design or authorized revisions.

#### 8. Project Design

(a) In the performance of this Agreement, the Consultant shall, to the extent practicable, provide for maximum use of structures, machines, products, materials, construction methods, and equipment which are readily available through competitive procurement, or through standard or proven production techniques, methods and processes.

(b) The Consultant shall not, in the performance of the Services called for by this Agreement, produce a design or specification such as to require the use of structures, machines, products, materials, construction methods, equipment or processes which are known by the Consultant to be available only from a sole source, unless such use has been adequately justified in writing by the Consultant and approved in writing by the County. If the County so directs, the Consultant shall obtain certain structures, machines, products, materials, construction methods, equipment or processes from the specified source. The County has the right to deny the use of structures, machines, products, materials, construction methods, equipment or processes from any source that it, in its sole discretion, deems objectionable.

(c) The Consultant shall report to the County any restrictive design or specification giving the reason or reasons why it is considered necessary to restrict the design or specification.

**9. Access to Records**

(a) The Consultant shall maintain books, records, documents and other evidence directly pertinent to performance under this Agreement in accordance with generally accepted accounting principles and practices consistently applied. The Consultant shall also maintain the financial information and data used by the Consultant in the preparation or support of the cost submission in effect on the date of execution of this Agreement and a copy of the cost summary submitted to the County. The County shall have access to such books, records, documents and other evidence for the purpose of inspection, audit and copying. The Consultant will provide proper facilities for such access and inspection.

(b) It is expressly agreed that the County, federal or state auditors and any other persons duly authorized by the County shall have full access to all records described in subsection (a) upon three (3) business days notice to the Consultant. Audits conducted pursuant to this provision shall be in accordance with generally accepted auditing standards and established procedures and guidelines of the reviewing or audit agency(ies).

(c) The Consultant agrees to maintain all records under paragraph (a) above for three (3) years from the date of final payment under this Agreement. In addition, those records which relate to any "Dispute" appeal or litigation, or the settlement of claims arising out of such performance, or costs or items to which an audit exception has been taken, shall be maintained and made available until three (3) years after the date of resolution of such appeal, litigation, claim or exception.

**10. Price Reduction for Defective Cost or Pricing Data**

The original contract price and any additions thereto shall be adjusted to exclude any significant sums where the County determines that the contract price was increased due to inaccurate, incomplete or noncurrent wage rates and/or other factual unit costs. Upon such



determination by the County, such price or cost or profit shall be reduced accordingly and this Agreement shall be modified in writing to reflect such reduction. All such price adjustments shall be made within one (1) year following the end of this Agreement.

**11. Subcontractors**

(a) Any Subcontractors required by the Consultant in connection with the Services covered by this Agreement will be limited to such individuals or firms as were specifically identified and agreed to during negotiations, or as specifically authorized by the County, in writing, during the performance of this Agreement. Any substitutions in or additions to such Subcontractors will be subject to the prior written approval of the County.

(b) The Consultant may not subcontract services in excess of thirty percent (30%) of the contract price to Subcontractors without prior written approval of the County.

(c) The Consultant agrees that each subcontractor agreement shall be in writing and shall provide that the pertinent provisions and requirements of this Agreement are incorporated into such subcontractor agreement. It shall be the Consultant's responsibility to determine that all such provisions are included and such provisions shall be implied where not specifically included.

(d) No subcontract shall release the Consultant of his liability under this Agreement. The Contractor shall be responsible for all acts or omissions of any Subcontractor and shall be liable for all damage caused by acts or omissions of any Subcontractor.

**12. Gratuities**

(a) If it is found, after notice and hearing, by the County that gratuities (in the form of entertainment, gifts, or otherwise) were offered or given by the Consultant, or any agent or representative of the Consultant, to any official, employee or agent of the County, with a view toward securing a contract or securing favorable treatment with respect to the awarding or amending, or the making of any determinations with respect to the performance of this Agreement, the County may, by written notice to the Consultant, terminate the right of the Consultant to proceed under this Agreement or may pursue such other rights and remedies provided by law or under this Agreement.

(b) In the event this Agreement is terminated as provided in paragraph (a) hereof, the County shall be entitled (1) to pursue the same remedies against the Consultant as it could pursue in the event of a breach of contract by the Consultant, and (2) as a penalty in addition to any other damages to which it may be entitled by law, to exemplary damages in an amount (as determined by the County) which shall not be less than three (3) nor more than ten (10) times the costs incurred by the Consultant in providing any such gratuities to any such officer or employee.

**13. Contingent Fees**

The firm offering professional services swears that it has not employed or retained any company or person, other than a bona fide employee working primarily for it, to solicit or secure this contract or purchase order, and that it has not paid to or agreed to pay to any person, other than a bona fide employee working primarily for it, any fee, commission, percentage, gift or any other consideration, contingent upon or resulting from the award or making of this contract or purchase order. For a breach or violation of this subsection, the County shall have the right to terminate the contract or purchase order without liability and, at its discretion, to deduct from the contract price or purchase order price or otherwise recover the full amount of such fee, commission, percentage, gift or consideration.

**14. Ownership and Rights in Data**

(a) The Consultant acknowledges that the County shall have exclusive, unlimited ownership rights to all works performed or created under this Agreement including all layers of design and all drawings, specifications, models, materials, information and deliverables prepared hereunder or developed as a result of Services performed hereunder (e.g., Consultant's points file, AUTO CAD drawings, meter data and hydraulic models). All of the foregoing shall be deemed to be work made for hire and made in the course of services rendered and shall belong exclusively to the County, with the County having the sole right to obtain, hold and renew, in its own name and/or for its own benefit, patents, copyrights, trademarks, trade secrets, registrations and/or other appropriate protections.

(b) All drawings, specifications, models, materials, information and deliverables prepared for the County by the Consultant hereunder shall be delivered to the County when so requested by the County. In addition, the Consultant must provide the County with at least one editable electronic file of its work.

(c) All such data furnished by the Consultant pursuant to this Agreement are instruments of its services in respect of the project. It is understood that the Consultant does not represent such data to be suitable for re-use on any other project or for any other purpose. Any re-use by the County of such data beyond its original intent and purpose without specific written authorization by the Consultant will be at the risk of the County.

(d) Work created under this Agreement by the Consultant or anyone employed by the Consultant is not intended to include any proprietary software and associated rights or off the shelf training materials or training products developed by a trainer for group or individual learning, regardless of whether the materials or products are modified for use at the County.

(e) To the extent that exclusive title and/or ownership rights may not originally vest in the County as contemplated in subsection (a), the Consultant hereby irrevocably assigns, transfers and conveys to the County all right, title and interest therein. The Consultant and its personnel shall give the County and/or any County designee, at the County's expense, all reasonable assistance and execute all documents necessary to assist and/or enable the County to perfect, preserve, register and/or record its rights in any such work, materials, information and/or deliverable.

**15. Confidentiality**

(a) All work performed under this Agreement shall be confidential in nature. As such, all documents created pursuant to the terms of this Agreement shall be marked "Privileged and Confidential". In addition, no employee, agent or assign of the Consultant shall convey information obtained in the course of fulfilling its contract obligations to any person or entity other than the County without first obtaining the County's express written authorization, provided that the Consultant, its employees, agents or assigns may convey information to entities other than the County if the conveyance of the information is necessary to obtain required permits or otherwise fulfill contract requirements.

(b) The County specifically prohibits the photographing of any project or County property, reproduction of any work product developed hereunder by the Consultant for publicity or advertising or for any other purpose outside the scope of performance of this Agreement without the express prior written authorization of the County.

**16. Warranty; Indemnification; Remedies**

(a) The Consultant represents and warrants that: (i) this Agreement constitutes the legal, valid and binding obligation of the Consultant, enforceable against the Consultant in accordance with its terms; (ii) the execution, delivery and performance of this Agreement have been duly authorized by all necessary corporate or other action of the Consultant; and (iii) the execution and delivery of this Agreement and all agreements, documents and instruments executed and delivered by the Consultant pursuant hereto and the performance of the transactions contemplated by this Agreement and such other agreements, documents and instruments, do not and will not violate, conflict with or result in a violation of, or constitute a default under any provision of any law, regulation or rule, or any board or governmental agency.

(b) The Consultant further represents and warrants that: (i) the performance of the Services by the Consultant will be in accordance with all applicable laws and regulations; (ii) all Services will be performed in accordance with the instructions and directions of the County; (iii) each of the Consultant's personnel working on the project will be duly qualified to provide such Services, including, if appropriate, appropriate professional licensure; (iv) there are no relevant facts that could give rise to a conflict of interest under this Agreement; and (v) the performance of the Services will not violate any proprietary rights of any third party (including, without limitation, any third party confidential relationships, patent, copyrights, trade secrets or other proprietary rights).

(c) The Consultant agrees to indemnify and hold harmless the County, its officers, directors, agents, employees, licensees, contractors, guests and invitees, from and against any and all actions, claims, damages, losses, expenses and other associated costs (including, without limitation, fees and charges of attorneys and other professionals and court costs) asserted against or suffered by any such indemnified party by reason of (i) any breach by the Consultant of the terms of this Agreement (including, without limitation, any failure of the Consultant to timely deliver the Services); (ii) any violation of any laws, ordinances, regulations, orders and decrees that govern the Consultant's performance hereunder, and (iii) any negligent act or omission or willful misconduct on the part of the Consultant or any partner, member,

shareholder, officer, employee or agent of the Consultant in connection with the performance of its obligations hereunder. These indemnification obligations shall survive termination of the Agreement.

(d) The rights or remedies provided in and contemplated by this Agreement are cumulative and not exclusive of any other rights or remedies provided by applicable law. In addition to actual damages, the County may recover any incidental or consequential damages suffered as a result of the Consultant's breach.

**17. Most Favored Customer**

Upon execution of this Agreement, until the expiration of the term of this Agreement, Consultant agrees to treat the County as its most favored customer in connection with its obligations under this Agreement, including but not limited to the assignment of staff on a priority basis. In accordance with such treatment, Consultant agrees not to re-assign any staff assigned to County projects to other projects until such time as the Consultant's projects are completed to the County's satisfaction.

**18. Restrictions on Contracting with the County**

Section 2.05.502.B(3) of the New Castle County Code requires that the provisions of Section 2.03.103.C of the New Castle County Code are provided to all professional service contractors whose contracts are valued at more than Five Hundred Dollars (\$500.00). The provisions of Section 2.03.103.C of the New Castle County Code are reproduced below:

No County official or County employee or his or her spouse, child, parent, step-parent or sibling of the whole or half-blood or any business with which the County official or County employee or his or her spouse, child, parent, step-parent or sibling of the whole or half-blood is associated or who has a legal or equitable ownership of more than five (5) percent (more than one (1) percent in the case of a corporation whose stock is regularly traded on an established securities market) shall enter into any contract with the County (other than an employment contract) or any subcontract with a County contractor unless such contract or subcontract was made or let after public notice and competitive bidding. Such notice and bidding requirements shall not apply to a contract not involving more than five hundred dollars (\$500.00) per year if the terms of such contract reflect arms' length negotiations, if the subcontractor is a sole source provider, or if there are exigent circumstances. There will be a rebuttable presumption of a knowing and willing violation of the section only if the contract or subcontract is awarded to a spouse or child of the County employee or official.

**19. Mutual Drafting**

The parties hereto are sophisticated and have been represented by attorneys throughout the transactions contemplated hereby who have carefully negotiated the provisions

hereof. As a consequence, the parties do not intend that the presumptions of laws or rules relating to the interpretation of contracts against the drafter of any particular clause, should be applied to this Agreement or any agreement or instrument executed in connection therewith, and therefore waive their effects.

**20. Headings**

The headings of the various sections contained in this Agreement are intended for convenience of reference only and in no way define, limit or describe the scope or intent of this Agreement or in any way affect the interpretation of this Agreement.

**21. Notices**

Except as otherwise herein provided, any notices under or pursuant to this Agreement shall be in writing and shall be delivered either by personal delivery, by telecopy or electronic mail, by nationally recognized overnight courier or by certified or registered mail, return receipt requested, addressed as follows:

If to the County, to:

**David A. Hofer, PE  
Assistant County Engineer  
New Castle County, Department of Special Services  
Engineering and Environmental Services Division  
187-A Old Churchman's Road**

If to the Consultant, to:

**Gerald S. Jannetti, P.E.  
Vice President, PB Americas, Inc.  
Delaware, Maryland, and West Virginia Business Manager  
100 South Charles Street, 10<sup>th</sup> Floor, Tower 1, Baltimore, MD 21201**

or at such other address as the party affected shall designate, subsequent to the date of this Agreement, by written notice given in the matter herein above set forth. Notices shall be deemed given when sent, if sent by telecopy or electronic mail with delivery confirmed; one day after mailing, if sent by nationally recognized overnight courier; when delivered and receipted for (or upon the date of attempted delivery where delivery is refused), if hand-delivered; or when receipted for (or upon the date of attempted delivery where delivery is refused or a properly addressed and mailed notice is returned as undeliverable or unclaimed), if sent by certified or registered mail.

**22. Severability**

If any provision or provisions of this Agreement shall be held to be invalid, illegal or unenforceable for any reason whatsoever: (a) the validity, legality and enforceability of the remaining provisions of the Agreement (including without limitation, each portion of any Section of this Agreement containing any such provision held to be invalid, illegal or

unenforceable, that is not itself invalid, illegal or unenforceable) shall not in any way be affected or impaired thereby and shall remain enforceable to the fullest extent permitted by law; (b) such provision or provisions shall be deemed reformed to the extent necessary to conform to applicable law and to give the maximum effect to the intent of the parties hereto; and (c) to the fullest extent possible, the provisions of this Agreement (including, without limitation, each portion of any Section of this Agreement containing any such provision held to be invalid, illegal or unenforceable, that is not itself invalid, illegal or unenforceable) shall be construed so as to give effect to the intent manifested thereby.

**23. Entire Agreement; Interpretation**

This Agreement, including the Consultant's Proposal, constitutes the entire agreement between the parties with respect to the subject matter hereof. Any and all prior understandings are merged herewith and superseded hereby. This Agreement may not be changed, waived, modified or amended except by an instrument in writing signed by the party against whom such change, waiver, modification or amendment is sought to be enforced. The Consultant confirms and agrees that no representations of any kind whatsoever have been made to them by the County other than as appear in this Agreement, that they have not relied on any such representations and that no claim that they have so relied may be made at any time or for any purpose. All of the terms of the Consultant's Proposal are incorporated in and form a part of this Agreement; provided, that in the event of any conflict or inconsistency between the terms of this Agreement and the terms of such Consultant's Proposal, then the terms of this Agreement shall govern.

**24. Assignment**

The Consultant shall have no right to assign, convey, subcontract, pledge or otherwise transfer this Agreement, or any interest herein or any right to payment hereunder, or any duty, obligation or claim hereunder, without the prior written approval of the County, which approval may be withheld in the County's absolute discretion.

**25. Independent Contractor**

It is expressly understood and agreed that the Consultant, in performing its obligations under this Agreement, shall be deemed an independent contractor and not an agent or employee of the County. The Consultant has no authority to enter into any contracts or other agreements with any person or entity on behalf of the County or otherwise to bind the County. Furthermore, nothing contained in this Agreement shall be construed to mean that the County and the Consultant are joint ventures, partners or the like.

**26. No Waiver**

The failure of the County to insist upon the strict performance of any provisions of this Agreement, the failure of the County to exercise any right, option or remedy hereby reserved, or the existence of any course of performance hereunder shall not be construed as a waiver of any provision hereof or of any such right, option or remedy or as a waiver for the future of any such provision, right, option or remedy or as a waiver of a subsequent breach thereof. The payment by the County of any amount due hereunder with knowledge of a breach of any provision of this Agreement shall not be deemed a waiver of such breach.

**27. Further Assurances**

Each of the parties hereto agrees to execute such documents, to make such filings with regulatory authorities, and otherwise to provide such cooperation as the County, on the one hand, or the Consultant, on the other hand, may reasonably request in order to consummate the transactions contemplated by this Agreement.

**28. Business Days**

The term "business days" as used in this Agreement shall mean all calendar days excluding Saturdays, Sundays and any public holidays recognized by the County.

**29. GOVERNING LAW; CONSENT TO JURISDICTION**

THIS AGREEMENT SHALL BE GOVERNED BY, AND CONSTRUED AND ENFORCED IN ACCORDANCE WITH, THE LAWS OF THE STATE OF DELAWARE. THE CONSULTANT HEREBY IRREVOCABLY CONSENTS, FOR ITSELF AND ITS LEGAL REPRESENTATIVES, PARTNERS, MEMBERS, SUCCESSORS AND ASSIGNS, TO THE EXCLUSIVE JURISDICTION OF THE COURTS OF THE STATE OF DELAWARE AND OF THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE FOR ALL PURPOSES IN CONNECTION WITH ANY ACTION OR PROCEEDING WHICH ARISES FROM OR RELATES TO THIS AGREEMENT, AND HEREBY WAIVES ANY RIGHTS IT MAY HAVE TO PERSONAL SERVICE OF SUMMONS, COMPLAINT, OR OTHER PROCESS IN CONNECTION THEREWITH, AND AGREES THAT SERVICE MAY BE MADE BY REGISTERED OR CERTIFIED MAIL ADDRESSED TO SUCH CONSULTANT AND SENT IN ACCORDANCE WITH THE PROVISIONS OF SECTION 21 HEREOF.

**30. No Waiver of Immunity**

Nothing in this Agreement is intended to waive the sovereign immunity of New Castle County or the immunity granted to New Castle County and its employees in the County and Municipal Tort Claims Act contained in Title 10, Chapter 40 of the Delaware Code.

PAGE 15 of 15

IN WITNESS WHEREOF, the undersigned have caused this Agreement to be executed as of the date first written above.

*S. MacNeil*  
Witness

*Gerald S. Jannetti*  
Gerald S. Jannetti, P.E.,  
Vice President  
PB Americas, Inc.

Recommend Approval:

*David A. Hofer*  
Witness

*Christy Gleason*  
Witness

NEW CASTLE COUNTY

*MSK 12/8/09*  
General Manager - Special Services  
*Christopher Coburn*  
County Executive (Seal)









**Parsons  
Brinckerhoff**

100 South Charles Street  
Tower 1, 10th Floor  
Baltimore, MD 21201-2727  
Main: 410-727-5050  
Fax: 410-727-4608

October 28, 2009

Exhibit A

David A. Hofer, PE  
Assistant County Engineer  
New Castle County, Department of Special Services  
Engineering and Environmental Services Division  
187-A Old Churchman's Road  
New Castle, DE 19720

Re: Governor Printz Interceptors Project (#06P-013)  
Revised Proposal for Phase IIb Design Engineering Services  
(Expedited Governor Printz & Knollwood Interceptors & Tunnel)

Dear Mr. Hofer,

Per your request, please find enclosed PB's revised proposal for completion of Design Phase IIb of the Governor Printz Interceptors Project. The proposal has been revised from the original proposal dated September 11, 2009 to include televised inspection of existing sewers as well as the following changes:

1. A \$100,000 contingency for potential additional engineering design effort is included to expedite the design process for the Governor Printz Interceptor design to produce 90 percent ready-to-bid documents by Monday, January 4, 2010 and final 100 percent ready-to-advertise documents before the end of February. These conditions are subject to the following:
  - New Castle County will expedite the notice to proceed for this proposal.
  - Permits will still be in process when the project is bid.
  - Some assistance may be needed to expedite the DelDOT permit.
  - A field trip to the Stoney Creek Pump Station needs to be scheduled as soon as possible so that the proposed sewer tie-in at the pump station and overall interceptor sewer alignment can be finalized.
  - Rather than having interim approvals at fixed percentage points, the approval process will be continuous and on an as needed basis. *[Note: As previously agreed, PB will provide a preliminary engineers opinion of probable cost for construction by Thursday, November 26, 2009.]*
  - Some meetings will be in the Baltimore office instead of at New Castle County.
2. A \$100,000 contingency is included in the Knollwood Interceptor & Tunnel design. This is to account for unknowns in the project, primarily in coordinating the optimum location for





the junction chamber and the tunnel under Interstate Highway I-495 that will connect the Knollwood Interceptor to the Governor Printz Interceptor.

With this revised proposal, PB is requesting \$2,422,933 for consulting engineering services to provide the desired design services for Phase IIb. Below is a summary of the overall request. These costs do not include construction services for Phase III (Construction Phase Services), which will be included in a separate contract:

• Expedited Governor Printz Interceptor:	\$576,271
• Knollwood Interceptor & Tunnel:	<u>\$1,846,662</u>
Total	\$2,422,933

We sincerely appreciate this opportunity to provide continued engineering assistance to New Castle County. If you have any questions, please contact me at (410) 385-4193 or our project manager Rudy Fernandez at (561) 227-1293.

Sincerely,

A handwritten signature in black ink, appearing to read 'G. S. Jannetti'.

Gerald S. Jannetti, P.E.  
Vice President  
Delaware, Maryland, and West Virginia Business Manager



**EXHIBIT A – PART 1**

**EXPEDITED GOVERNOR PRINTZ INTERCEPTORS PROJECT**

**NEW CASTLE COUNTY, DELAWARE**

**#06P-013**

**SCOPE OF DESIGN ENGINEERING SERVICES**

**October 28, 2009**

This proposed scope is for design engineering services for the Governor Printz Interceptors Project, Design Phase IIb, Part 1 (Expedited Governor Printz Interceptors Project). The scope includes engineering design of the downstream Governor Printz Interceptor segment as developed through consultation with New Castle County (NCC) Special Services Division. Deliverables and task descriptions, followed by a man-hour level of effort (LOE) with bill rates, are provided below. The detailed LOE reflects the required effort to complete the design and is used to estimate the overall associated cost. Distribution of hours may vary based on actual execution and requirements of the project. This budget is intended to represent a not-to-exceed estimate based on the data available. Unforeseen conditions or variables will require modifications to the assumptions made. Any major changes in budget allocations will be communicated with NCC as soon as they are identified. Phase III Construction Management will be included in a separate scope of services at a later date.

**I PROJECT OVERVIEW**

A significant portion of NCC's sewer system is known as the Brandywine Hundred Sewer System (BHSS). Figure 1 shows the BHSS, which encompasses four main sewersheds, including the Naamans, North Delaware, Shellpot, and Brandywine sewersheds. The overall system serves nearly 25,000 properties and consists of approximately 420 miles of sewer lines and three major pump stations. All sewerage flow is conveyed to the Wilmington Wastewater Treatment Plant.

The BHSS was primarily built in the 1940s through 1960s. The aging system experiences extremely high rainfall-induced inflow and infiltration (I/I) resulting from private property connections and structural defects. The system has two relief structures upstream of the Naamans and Stoney Creek Pump Stations, which discharge to the Lower Naamans Creek and the Delaware River, respectively, during heavy rainfalls.

In the late 1990s, NCC began to plan for increased replacement, rehabilitation, and maintenance efforts for the entire system. By 2000, NCC recognized that significant work was needed to address age-related deterioration and insufficient capacity.

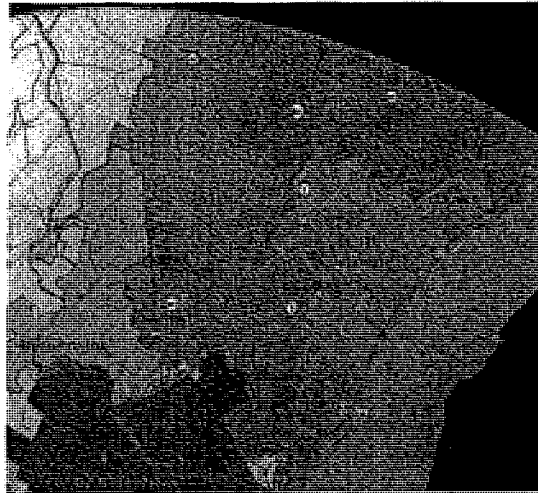


Figure 1 Brandywine Hundred Sewersheds

In 2002, the Department of Natural Resources and Environmental Control (DNREC) and NCC proactively developed a Secretary's Order to facilitate a timely and cost effective solution to problems in the BHSS. In accordance with the Order, NCC committed to rehabilitate the sewer system and eliminate regular overflows. This Order was signed on October 7, 2003.

In October 2004, NCC developed a Combined Sewer Overflow (CSO) Elimination Plan. As part of the plan, NCC is implementing an I/I Reduction Program and has initiated several projects including upgrades to the Stoney Creek Pump Station (SCPS) and two interceptor sewer replacement projects. The North Delaware Interceptor Project is located downstream of the SCPS and is under construction. This project involves design for the Governor Printz Interceptors (GPI) Project, which is located upstream of the SCPS, within the Naamans and North Delaware sewersheds.

Figure 2 shows the location of the GPI Project. The interceptors convey sewerage flow to the SCPS from:

- Naamans Interceptor
- Old Naamans Interceptor
- Naamans Pump Station forcemain
- Knollwood Interceptor
- Rolling Park Interceptor

The GPI Project includes three phases:

- Phase I evaluated the condition and capacity of the existing interceptors and examined alternatives to alleviate problems and prevent overflows. Recommendations were presented in the *Governor Printz Interceptors Preliminary Basis of Design Report (BODR)*, dated January 2008.
- Phases II includes detail design. Phases II & IIb, Part 1 includes replacement of the downstream GPIs, located within Governor Printz Boulevard and Governor Printz Boulevard Extended, between Stoney Creek and Manor Avenue; and along the ditch parallel to Interstate Highway I-495, up to the I-495 crossing near the Myrtle Avenue bridge. (Additional

detail is provided in the *Phase II BODR, dated August 2009.*) Phase IIb, Part 2 includes replacement of the Interstate Highway I-495 sewer crossing, west of the Myrtle Avenue Bridge, a railroad crossing southeast of Myrtle Avenue, and the Knollwood Interceptor.

- Phase III includes construction.

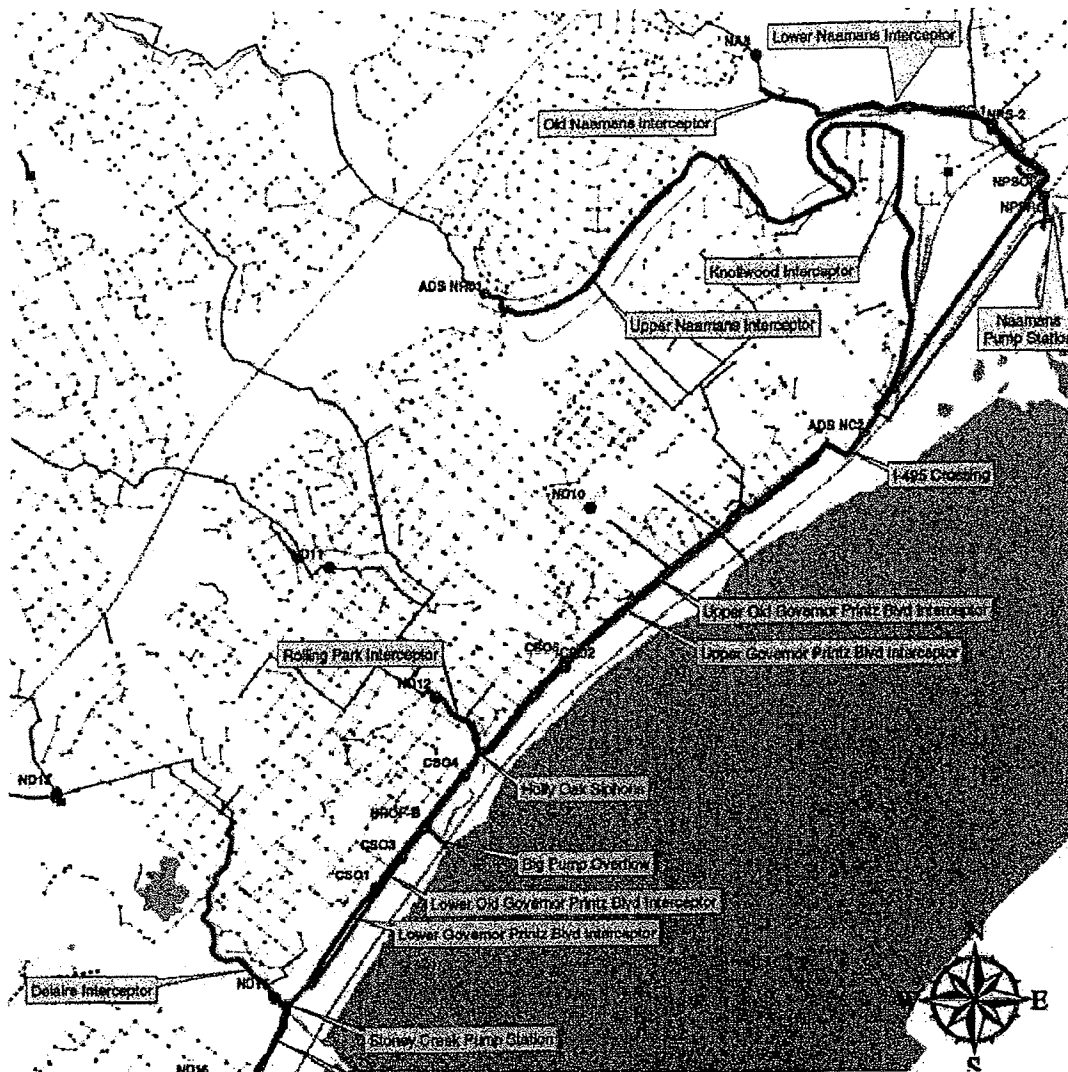


Figure 2 Governor Printz Interceptors Project Location



## II PHASE II DESIGN SCOPE CHANGES

Table 1 provides a summary of scope changes since the original Phase II Design Agreement was signed on June 23, 2008. In August, 2009 NCC released project contingency funds to cover expenses associated with some of the extra scope items. Table 1 identifies which tasks were associated with the contingency fund release.

**Table 1 Summary of Scope Changes for Phase II Design**

Task #	Description	Included in Contingency
Task 00	<b>Project Management</b>	
	Additional man-hours were added to reflect revised project schedule.	
Task 01	<b>Easements/Private Property Coordination</b>	
	a. <b>Dye Testing of Sanitary Fixtures:</b> Added to scope. PB will coordinate dye testing of sanitary fixtures for private properties adjacent to multiple sewers to identify connectivity.	
	b. <b>Easements:</b> Revised estimated hours to complete.	
Task 02	<b>Physical Condition/Connectivity Verification/Sewer Televising</b>	
	a. <b>Sewer Televising:</b> Added to scope. PB will coordinate televising by a subconsultant (CES) of existing sewers. PB will review the DVDs to determine service lateral locations and assess the condition of the sewers which may be kept to convey private property flow,	
Task 03	<b>Land Survey</b>	
	a. <b>Topographical and Buried Utility Survey:</b> PB completed coordination of additional surveys at Stoney Creek Pump Station, Holly Oak Creek, and across Interstate Highway I-495, east of Manor Avenue. PB is coordinating completion of additional surveying at the drain crossing near Grubbs Landing Road and along the ditch parallel to and across Interstate Highway I-495 west of the Myrtle Avenue bridge.	
	b. <b>Fish and Wildlife Study:</b> Added to scope.	
	c. <b>Contaminated Site Review and Sampling:</b> The scope for this task has been revised based on a proposed scope from subconsultant (TRC).	
Task 04	<b>Geotechnical and Tunnel Engineering</b>	
	a. <b>Management and Oversight of Supplemental Geotechnical Investigation:</b> Per discussions with NCC, PB will coordinate supplemental field investigations and laboratory testing, for locations as described below. The supplemental investigations will include approximately 15 blank auger borings and 15 to 20 soil and rock sampling borings.	
	<ul style="list-style-type: none"> <li>• <b>Along Governor Printz Boulevard:</b> The original proposed interceptor alignment was within the northbound lane and borings were performed primarily within the median. Because of design flow changes, the proposed pipes have increased in size and their alignment has changed to the southbound lanes. Both southbound lanes will likely be excavated to accommodate a larger trench width. The main purpose of the supplemental borings is to evaluate the variability of the top of rock surface and reduce contract risk. It is anticipated that additional borings may be drilled along the southbound shoulder, where the bedrock is known to be near or above the pipe invert. The bedrock will not be cored.</li> </ul>	
	<ul style="list-style-type: none"> <li>• <b>At Stoney Creek Pump Station:</b> Borings with soil and rock sampling are proposed at the pump station. Previously, borings were unable</li> </ul>	

Task #	Description	Included in Contingency
	to be drilled because of lack of information on as-built utilities.	
	<ul style="list-style-type: none"> <li>• <u>At Holly Oak Creek</u>: Additional borings with soil and rock sampling are proposed at the Holly Oak Creek crossing, which is on private property.</li> </ul>	
	<ul style="list-style-type: none"> <li>• <u>Parallel to and across Interstate Highway I-495</u>: Additional soil borings are required prior to finalizing the proposed I-495 crossing near the Myrtle Avenue bridge.</li> </ul>	
	<b>b. Coordination of Supplemental Laboratory Testing:</b> Revised estimated hours to complete.	
	<b>c. Geotechnical Data Report Supplement/Update:</b> Revised estimated hours to complete.	
	<b>d. Geotechnical Analysis and Design of Cut-and-Cover and Tunnel Pipe Segments:</b> Subsurface soil, rock, and groundwater data will be analyzed to provide a final recommendation for the proposed interceptor alignment, including the I-495 tunnel crossing.	
	<b>e. Geotechnical Analysis and Design for Manholes and Structures:</b> Revised estimated hours to complete.	
	<b>f. Geotechnical Design Memorandum:</b> PB will prepare a geotechnical design memorandum that will summarize the subsurface conditions encountered in the supplemental investigations and impacts on design.	
	<b>g. Geotechnical Baseline Report (GBR):</b> Geotechnical data for the I-495 tunnel crossing is included in the GBR for the Phase II, Part 2, Knollwood & Tunnel Project Design. This task has been removed from this scope.	
	<b>h. Geotechnical Specifications and Estimates Relating to Excavations:</b> Revised estimated hours to complete.	
	<b>i. Geotechnical Profile Sheets:</b> PB is updating the geotechnical profile sheets to match changes in the construction drawings as described below.	
<b>Task 05</b>	<b>Hydraulic Model</b>	
	<b>a. System Hydraulic Model Runs:</b> After PB updated NCC's sanitary sewer system hydraulic model to incorporate the design of the twin 48-inch diameter pipes, revised design flows and additional modeling data were provided to PB. Subsequently, PB had to re-design the proposed pipe configurations and re-update the model. PB will prepare a technical memorandum documenting results from the model re-runs.	✓
<b>Task 06</b>	<b>Detailed Design Services</b>	
	<b>a. Pipe Material Research, Abrasion Study, and Plant Visits:</b> Per NCC request, PB performed research on the abrasion resistance of various pipe materials and visited several pipe manufacturing plants, including Flowtite in Zachary, LA, USCP in Alvarado, TX, Hobas in Houston, TX and KWH Pipe (Weholite) in Huntsville, Ontario.	✓
	Per NCC request, an additional pipe manufacturing plant visit will be scheduled to visit Advanced Drainage Systems, Inc. (ADS) in New Jersey.	
	<b>a1. Hydraulic Analyses:</b> Additional hydraulic analyses were required because of new design flows received from Malcolm Pirnie.	✓
	<b>a2. Basis of Design Report (BODR):</b> Per NCC request, a Phase II BODR was prepared to reflect the current design. This task was not included in the original Phase II Design scope because a BODR had been prepared during Phase I.	✓
	<b>b. Refinement of Proposed Interceptor Sewer Alignment:</b> There have been several pipe alignment changes for reasons described as follows.	

Task #	Description	Included in Contingency
	<ul style="list-style-type: none"> <li><u>Changed trench width:</u> PB will refine the proposed interceptor sewer alignment based on consideration of supplemental geotechnical data and the feasibility of eliminating the existing 42/48-inch sewer in Governor Printz Boulevard and increasing the trench width.</li> </ul>	
	<ul style="list-style-type: none"> <li><u>Holly Oak Creek:</u> Per NCC request, PB explored several options to construct a gravity sewer across Holly Oak Creek to avoid the need to construct a siphon. PB evaluated different tie-in options to the wetwell at the Stoney Creek Pump Station. After determining that a siphon was required to achieve adequate ground cover, PB designed the siphon and adjusted the proposed pipe alignment accordingly. Subsequently, NCC requested that PB investigate the option of building a gravity sewer for the smaller dry weather flow interceptor pipe (GP1) parallel to the siphon for the larger wet weather overflow interceptor pipe (GP2).</li> </ul>	
	<ul style="list-style-type: none"> <li><u>Grubbs Landing:</u> PB is evaluating constructing a gravity sewer across the drain beside Grubbs Landing Road to skirt around rather than the under the existing 7-foot by 8-foot box culvert in Governor Printz Boulevard.</li> </ul>	
	<ul style="list-style-type: none"> <li><u>I-495 Crossing:</u> PB is continuing to evaluate the best alternative on where to cross I-495 based on geotechnical data.</li> </ul>	
	<b>c. Holly Oak Creek Siphon Design and Stream Stabilization:</b> PB will redesign the siphon crossing to include multiple smaller modular chambers. The stream crossing design will also include stream stabilization.	
	<b>d. Design Private Property Service Connections:</b> PB will use results from the sewer televising and private property sanitary fixture dye testing to design service lateral connections.	
	<b>e. Storm Drain Modifications:</b> Revised estimated hours to complete.	
	<b>f. Utility Coordination/Conflict Resolution:</b> Revised estimated hours to complete.	
	<b>g. Traffic Study:</b> Additional traffic studies were required from the Delaware Department of Transportation (DelDOT) for development of traffic plans.	✓
	The traffic study will need to be updated to eliminate one of the northbound lanes in Governor Printz Boulevard so as to accommodate a larger trench width.	
	<b>h. Traffic Control Plan:</b> The level of effort required to prepare the Traffic Control Plan increased from the original scope because larger pipes (hence trench widths) are needed to convey the increased design flows.	
	<b>i. Permits and Approvals:</b> Revised estimated hours to complete.	
<b>Task 07</b>	<b>Construction Document Preparation</b>	
	<b>a. Drawings:</b> Plan and profile sheets required modifications to reflect the following changes.	
	<ul style="list-style-type: none"> <li>The proposed pipe configuration changed because of revised design flows obtained from MP.</li> </ul>	
	<ul style="list-style-type: none"> <li>The number of sheets increased and the sheet border setup changed when it was decided to increase the scale for clarity.</li> </ul>	
	<ul style="list-style-type: none"> <li>Additional sheets were prepared when the proposed sewer alignment changed from crossing I-495 at Manor Avenue and continuing along the Amtrak parking lot to extending the proposed interceptors along the ditch parallel to and across I-495 near the Myrtle Avenue bridge.</li> </ul>	

Task #	Description	Included in Contingency
	<ul style="list-style-type: none"> <li>The original scope did not include special details for flow diversion chambers, the Holly Oak creek siphon, or the drain crossing near Grubbs Landing Road.</li> </ul>	
	<b>b. Construction Cost Estimate:</b> Revised estimated hours to complete.	
	<b>c. Specifications and Front-End Documents:</b> Revised estimated hours to complete.	
<b>Task 08</b>	<b>Quality Assurance/Quality Control (QA/QC) and Constructability/Bid Reviews:</b>	
	<b>QA/QC and Constructability/Bid Reviews:</b> Per NCC request, PB is coordinating independent constructability reviews by Michael Kerr. PB Construction Services is also conducting constructability/bid reviews.	
<b>Task 09</b>	<b>Pre-bid Meeting and Bid Review</b>	
	Revised estimated hours to complete.	
<b>Task 10</b>	<b>Public / Regulatory Outreach</b>	
	At the direction of NCC, no public meetings are planned for this project. Therefore, this task has been removed from this scope of services.	
	<b>Subconsultant and Vendor Work</b>	
	This revised scope includes subconsultant work associated with the above scope changes, including private property dye testing, sewer televising, surveying, soil borings, and independent constructability/bid reviews.	

**Notes:**

1. Because the Phase IIb, Part 1 project primarily involves open-cut trenching, the detailed design for the tunneling portion of the project under Interstate Highway I-495 has been incorporated into Phase IIb, Part 2 Knollwood Project, which requires tunneling in several locations. This scope does, however, include preliminary design, including geotechnical investigation and analysis, for the I-495 crossing because its design impacts the alignment of the overall downstream Governor Printz Interceptor system.
2. The Phase II design included preliminary analysis and design for the flow diversion chamber near Myrtle Avenue. However, detailed design for the chamber is included in the Phase IIb, Part 2 Knollwood design because the location and dimensions are dependent upon whether a single or dual interceptor system is selected for the proposed Knollwood interceptor. This chamber also falls within the Part 2 project boundary.

**III DELIVERABLES**

PB will submit the following deliverables according to the revised Phase IIb project schedule:

- Easement plat drawings
- Fish and wildlife (endangered species) study
- Geotechnical design memorandum(s)
- Hydraulic model technical memorandum
- List of permits and approvals required
- Frequent communications, including meetings, supported by progress submittals
- 100 percent construction document submittals as described in Table 2.

Table 2 100 Percent Construction Document Submittal Contents

Design submittal	Drawings	Geotechnical Data Report (GDR)	Contaminated site review	Cost estimate	Construction sequence	Specifications and front end documents	Permits/ approvals
100%	✓	✓	✓	✓	✓	✓	✓

Senior PB staff will review all submittals prior to delivering them to NCC.

#### IV TASK DESCRIPTIONS

##### Task 00 Project Management

PB is responsible for management of staff and subconsultants as well as tasks related to project administration, including preparation of work plans, preparation of schedule and updates, bi-monthly progress meetings, and monthly progress reports.

##### Task 01 Easements / Private Property Coordination

- a. **Dye Testing:** PB will coordinate dye testing of sanitary fixtures for private properties adjacent to multiple sewers to identify connectivity. The fieldwork for this effort will be provided through a subconsultant (CES). It is assumed that dye testing will not extend beyond 50 properties.
- b. **Easements:** In coordination with, and to the standards of NCC's Right-of-Way Section, PB will review existing sewer easements along the interceptor route and will coordinate preparation of plat drawings for required permanent sewer easements and temporary construction easements. Easement review and preparation is anticipated to include deed research, survey of property boundaries, setting existing monumentation, and development of plat plans. The fieldwork for this effort will be provided through a subconsultant (JMT) conducting surveying services.

It is assumed that NCC's Program Manager, Malcolm Pirnie (MP) will perform work necessary to acquire the easements, including appraisals, negotiations, and agreements with property owners. *[Note: This scope of services does not include costs associated with easement and or property purchase.]*

*[Note: This scope does not include work associated with private property inflow and infiltration (I/I) removal. If requested by NCC, PB will prepare a separate scope of services for this task.]*

##### Task 02 Physical Condition/Connectivity Verification/Sewer Televising

- a. **Sewer Televising:** PB will coordinate televising of existing sewers by a subconsultant (CES). Existing sewers to be kept to convey flow from service lateral connections will be televised to determine the condition of the sewer. Where new service lateral connections are required, the existing sewers will be televised to determine the locations of service connections that will need to be rerouted. PB will review the DVDs and provide a written report documenting sewer condition and service lateral locations.

*[Note: This work scope does not include televising the existing 42/48-inch sewer in Governor Printz Boulevard or any sewer rehabilitation design. If televising the 42/48-inch sewer is needed or if rehab work is required, PB will prepare a separate scope of services for this task.]*

**Task 03 Land Survey**

- a. Topographical and Buried Utility Survey:** PB will coordinate completion of the topographical survey for the drain crossing near Grubbs Landing Road and along the ditch parallel to and across Interstate Highway I-495. The survey will include contours and land features such as trees with 18-inch or larger diameters. The subconsultant (JMT) is also to perform a buried services survey to locate all utilities and subsurface infrastructure within the bounded survey route, including storm drains. In addition, the subconsultant (JMT) will mark remaining proposed soil boring locations and will witness as-drilled boring locations as described in Task 04.
- b. Fish and Wildlife Study:** PB will conduct a preliminary assessment using online resources from U.S. Fish and Wildlife Service Chesapeake Field Office. If required, PB will prepare and send a letter, project description, and mapping, requesting the Chesapeake Field Office review project activities to determine if the proposed project would have any impact to Federally-listed threatened and endangered species. PB will also send a request to Delaware Natural Heritage Program to determine if any record of rare, threatened, or endangered species or natural communities exists in their database. Additionally, PB will coordinate with the National Marine Fisheries Service to determine if the proposed project will require an Abbreviated or Expanded Essential Fish Habitat Assessment. A copy of the environmental review will be provided to NCC for review. Should additional work, such as directed surveys, field meetings with resource agency personnel, rerouting the sewer alignment, or making provisions for habitat protection be required, PB will discuss additional scope of services with NCC.
- c. Contaminated Site Review and Sampling:** The project area may include pockets of contamination in the soil due to previous industrial activity in the area. PB will coordinate an environmental site assessment to be performed by a subconsultant (TRC). A cost allowance is included for six soil samples. The environmental site assessment report will be included with the contract documents.

It is not anticipated that soil contamination will be a major factor in the design or construction of the selected proposed sewer alignment. If contamination is encountered and further analyses or design changes, such as shifting the proposed sewer alignment, are required, then NCC will be contacted and additional scope of services will be assessed. *[Note: If contamination is encountered, the type of contamination and relevant issues will need to be determined, such as the chemical compounds and the risk to the construction process (e.g., contaminated groundwater plume migration, etc.) and appropriate measures will need to be incorporated into the bid documents to address contamination issues, such as dewatering restrictions or allowances for contaminated soil.]*

#### Task 04 Geotechnical and Tunnel Engineering

*[Note: This scope includes preliminary design and geotechnical analysis of the Interstate Highway I-495 crossing. This information is needed for design of the proposed sewer alignment downstream of the crossing. The detailed design and bid documents for the I-495 crossing is being incorporated into Phase IIb, Part 2, Knollwood & Tunnel Project.]*

- a. Management and Oversight of Supplemental Geotechnical Investigation:** PB will coordinate supplemental field and laboratory testing at locations as described above in Section II, Table 1. The supplemental investigation will include approximately 15 blank auger borings along Governor Printz Boulevard and approximately 15 to 20 soil and rock sampling borings in select areas along Governor Printz Boulevard and in the Interstate Highway I-495 crossing area. The blank auger borings will be advanced to top of rock as indicated by auger refusal. The soil and rock sampling borings will be advanced and sampled through soil and bedrock for obtaining additional subsurface design information.

PB will provide management and oversight of the supplemental subsurface investigations. Oversight will include site visits prior to and during the investigations, coordinating with the subcontractors and other stakeholders to obtain permits and access, laying out borings in the field, managing schedules, reviewing invoices, and performing supervision and monitoring of field drilling operations. PB oversight of field drilling operations will include directing sampling locations, depths, types, procedures, and backfilling and restoration needs, as well as logging and classifying the recovered samples. The geotechnical investigation will be carried out in accordance with the current industry practice and PB's approved geotechnical and tunneling quality manual as required by the firm's ISO 9000 certification.

The drilling and sampling program will consist of auger borings advanced through soil, boulders, and bedrock to appropriate depths for design of the proposed interceptor sewers. Soil and rock sampling will be performed in the borings as indicated above. In sampling borings, soils will be sampled using standard penetration testing (SPT) and thin-walled samplers. Boulders and bedrock will be cored using double-tube coring methods in these borings. Recovered samples will be classified and logged by a representative of PB. Recovered samples will be stored and transported back to a laboratory for additional follow-up testing. Rock along the tunnel alignment may be pressure tested in order to estimate the rock mass permeability and possible groundwater inflows into the tunnel during construction. Borings will be performed at manhole or tunnel shaft locations and other critical locations for the tunneling and open trench operations. Groundwater levels will be measured during and following drilling operations. Groundwater monitoring wells will be installed at select locations to obtain accurate long-term water level readings. The drilling and sampling operations will be performed in level D personal protection by a subconsultant. If environmental contaminants are encountered in a boring, the boring will be terminated and grouted and NCC will be notified. A limited amount of environmental sampling is included in this scope under Task 03.c. If environmental investigation and sampling beyond Task 03.c is needed, PB will provide a supplemental proposal to address the required services.

- b. Supplemental Laboratory Testing:** PB will plan and perform additional laboratory testing of recovered soil and rock samples from supplemental borings. Recovered soil and rock samples will be tested by a subconsultant in an AASHTO accredited testing laboratory. Laboratory soil testing will be performed to verify field classifications, determine natural water contents, and may be used to determine engineering properties including shear

strength, corrosivity, and deformability that may affect the installation or design of the proposed pipeline. Recovered rock samples will be tested for engineering properties that will be relevant to the construction methods, including compressive and tensile strength, elastic properties, and abrasivity. PB will develop the laboratory testing program including determining which samples to be tested and types of testing to be performed. PB will review the results for quality control and incorporate the results into the final boring logs.

- c. **Geotechnical Data Report (GDR) Supplement:** Once the supplemental investigations and laboratory testing are completed, a supplemental GDR or update to the initial GDR will be prepared. The GDR includes final typed boring logs, results of field and laboratory tests, photographs of recovered rock cores, and groundwater monitoring data. Relevant historic information is also included. The GDR is a factual report that presents data only for inclusion as information in the contract documents; no interpretations or recommendations are included.
- d. **Geotechnical Analysis and Design of Cut-and-Cover and Tunnel Pipe Segments:** Subsurface soil, rock, and groundwater data will be analyzed to provide a final recommendation for the proposed interceptor alignment, including the Interstate Highway I-495 crossing. The subsurface data will be interpreted and evaluated to determine external loading conditions for cut-and-cover pipe segments during construction and after construction. External geotechnical design loads for both hard rock and/or soft ground conditions will be provided to the contractor and pipe manufacturer for the structural design of the pipe. The potential for settlement, heave, or vibration-induced damage during excavation or tunneling will be evaluated. The potential for post-construction settlement will be evaluated as well. The need for ground improvements and instrumentation and monitoring will also be evaluated. The tunnel design will include finalizing the alignment, preliminary design, and construction considerations. Final design details for bid documents will be prepared as part of the Phase IIb, Part 2 bid documents.
- e. **Geotechnical Analysis and Design for Manholes, Special Structures, and Tunnel Shafts:** PB will analyze subsurface external loads for proposed manholes, structures, and tunnel shafts. Design loads will be analyzed for two conditions; soft ground and rock. These two design conditions will be used throughout the project where new manholes or structures are required. Geotechnical design loads will be provided to the contractor and manufacturer for the structural design of the manholes, structures, and tunnel shafts.
- f. **Geotechnical Design Memorandum(s):** PB will prepare a geotechnical design memorandum for internal project team use that will present a summary of the subsurface conditions encountered, including the supplemental investigations, laboratory testing results, interpretations of anticipated subsurface conditions and ground behavior, and recommendations for design and construction. The results of the geophysics investigation and report will include interpretations regarding depth and hardness of bedrock; and therefore, these results will be presented and discussed in the geotechnical design memorandum, and not in the GDR.
- g. **Geotechnical Baseline Report (GBR):** Geotechnical data for the Interstate Highway I-495 tunnel crossing will be included in the GBR for the Phase IIb, Part 2, Knollwood & Tunnel Project Design. This task has been removed from this scope.
- h. **Geotechnical Specifications and Estimates Relating to Excavations:** Geotechnical specifications and quantity/cost estimates will be prepared based on geotechnical



investigations. Special provisions will be prepared for open cut-excavations, dewatering, and ground condition instrumentation and monitoring. *[Note: Specifications and estimates for the I-495 tunnel crossing will be included in the Phase IIb, Part 2 construction documents.]*

- i. Geotechnical Profile Sheets:** Geotechnical profile sheets, including final boring logs, will be updated accordingly for inclusion in the contract documents.

#### **Task 05 Hydraulic Modeling**

- a. Update Existing Hydraulic Model:** In compliance with the Department of Natural Resources and Environmental Control's (DNREC) Secretary's Order to address problems within the Brandywine Sewer System, NCC's Program Manager, Malcolm Pirnie (MP) developed a hydraulic model of the County's sewer system using XP Storm Water Management Model (XP SWMM) Software.

PB is updating the hydraulic model to include the proposed re-designed interceptor alignment and is in the process of re-running the model to verify that the proposed interceptor design meets the requirements for the revised design dry weather flows and 3-year, 24-hour design storm condition provided by MP.

In addition, the model will be used to assess the impacts and potential hydraulic concerns for the proposed sewer alignment for the following rainfall events:

- July 12, 2004 storm event
- 5-year, 24-hour Soil Conservation Service (SCS) storm event
- 10-year, 24-hour SCS
- 25-year, 24-hour SCS

Hydraulic gradeline (HGL) profiles will be prepared for each of the runs. Results will be summarized in a technical memorandum.

#### **Task 06 Detailed Design Services**

The proposed interceptor sewer, including highway, railroad and stream crossings will be designed per NCC standards and in accordance with Delaware Department of Transportation (DelDOT), Amtrak, DNREC, and US Army Corps of Engineer (USACE) requirements.

*[Note: It is assumed that the structural analysis and design of the interceptor sewer pipe, manholes, and special structures, including flow diversion or other chambers, will be the responsibility of the manufacturer. PB will provide preliminary, non-structural, design layout details in the construction drawings and will provide external loading requirements based on geotechnical considerations in the contract specifications. Should the request a more detailed structural review and design effort, additional scope and budget will be negotiated.]*

- a. Pipe Material Research, Abrasion Study, and Plant Visits:** Per NCC request, PB is conducting literature and Internet research on abrasion resistance of pipe materials such as glass-reinforced fiber, high-density polyethylene pipe (HDPE), clay, and reinforced concrete. To date, PB has conducted inspection trips for the purpose of material approvals to the following pipe manufacturing plants: Flowtite in Zachary, LA, USCP in Alvarado, TX, and Hobas in Houston, TX, and KWH Pipe (Weholite) in Huntsville, Ontario. A future pipe manufacturing plant visit may be conducted.

- b. Refine Proposed Interceptor Sewer Alignment:** PB will refine the proposed interceptor sewer alignments based on consideration of supplemental survey and geotechnical data and the feasibility of eliminating the existing 42/48-inch sewer in Governor Printz Boulevard and increasing the trench width.

PB will further evaluate constructing a gravity sewer for the smaller interceptor sewer designed to convey dry weather flow (GP1) parallel to the depressed sewer (siphon) for the larger interceptor sewer designed to convey wet weather overflow (GP2) at Holly Oak Creek.

Survey data will also be used to confirm the feasibility of constructing a drain crossing upstream of the 7-foot by 8-foot box culvert near Grubbs Landing Road.

The hydraulic analyses will be updated to reflect changes in the proposed interceptor sewer alignments. Calculations will be done using design dry and wet weather flows for the 3-year, 24-hour design storm condition as provided by NCC's Program Manager, Malcolm Pimie (MP). It is assumed that no additional hydraulic analyses are required for the flow diversion chambers at Holly Oak Creek and Pennsylvania Avenue. *[Note: The flow diversion chamber near Myrtle Avenue is included in the Phase IIb, Part 2, Knollwood & Tunnel Project design scope.]*

- c. Holly Oak Creek Siphon Design and Stream Stabilization:** PB will redesign the siphon crossing at Holly Oak Creek. In addition to changing the proposed sewer alignment as described above, PB will redesign the siphon chambers so that instead of having a large chamber at the upstream end and a large chamber at the downstream end which convey flow for both GP1 and GP2 interceptors, the design will include four to six smaller chambers, which can be more easily pre-manufactured and transported to the site.

Changing GP1 to a gravity sewer across Holly Oak Creek will also include designing stream stabilization on both the north and south sides of Governor Printz Boulevard (i.e., at the interceptor crossing and downstream of the road culvert).

- d. Private Property Service Connections:** PB will investigate the locations where existing sewers in the southbound lane of Governor Printz Boulevard may be kept to service private properties and connected to the proposed interceptor sewer system at appropriate manholes. Where keeping the existing sewers to service properties is not feasible, service laterals will be rerouted from the old sewer system to new manholes along the proposed interceptor sewer. PB will use results from the sewer televising and private property sanitary fixture dye testing to design service lateral reconnections. *[Note: NCC sewer standards require that, for sewers 15 inches and larger in diameter, private property service laterals shall connect to manholes and not directly to the sewers.]*

- e. Storm Drain Modifications:** This task includes review of existing storm drains that might interfere with the proposed sewer lines. PB will assess required changes in the storm drainage system to resolve conflicts with the proposed sanitary sewer alignment. In the event that permitting or site conditions require major modifications, additional scope and budget will be negotiated with NCC.

- f. Utility Coordination/Conflict Resolution:** PB will coordinate with various utility companies to review construction impacts on existing utilities. PB will utilize the buried utility survey to

route the proposed interceptor sewer alignments to minimize conflicts with existing utilities. PB will meet with utility representatives in the field as necessary to coordinate requirements for protection of utilities during construction. Construction drawings and special provisions for utility support will be submitted to the appropriate utility companies for their review. Meetings and discussions with the utilities are to be documented and copied to NCC within one week of the meeting. *[Note: It is assumed that any required utility relocation will be the responsibility of the utility owner.]*

- g. Traffic Study:** PB will revise the traffic study prepared to meet the requirements for a Transportation Management Plan (TMP) in accordance with DelDOT's Work Zone Safety and Mobility Policy and Procedures for work impacting state roadways. The prior study was approved by DelDOT as presented in draft form on September 17, 2008. Revisions will address changes to the scope of the project as follows:

- Expanding the necessary width of the construction zone along Governor Printz Boulevard, which is expected to reduce available lanes to one lane in each direction in areas where construction is taking place from the southern limits of the project (at Stoney Creek Pump Station) and up to Governor Printz Boulevard Extended.
- Extending construction along Governor Printz Boulevard Extended up past Manor Avenue.

It is assumed that these changes will not result in "significant" impacts that would trigger a change from Type A TMP to Type B TMP under DelDOT criteria.

- h. Traffic Control Plan:** PB will develop a Traffic Control Plan for the construction work in accordance with DelDOT standards and requirements. The Traffic Control Plan will be used in the permitting process and the approved plan will be included in the contract documents. Specific elements to be included are as follows:

- General notes
- Sequence of construction based on a breakdown of construction phasing for maintenance of traffic (MOT)
- Work zone traffic control (WZTC) details for each phase of construction noting proposed location of channelizing devices (cones or drums), limits of work zone, flaggers, temporary paving, temporary pavement markings, temporary signs, barricades, barriers, and flow arrows indicating active traffic lanes
- Special provisions and specifications for MOT
- Engineers cost estimate of MOT items

PB will provide on-going coordination with DelDOT to solicit and respond to agency input regarding detailed requirements for WZTC setups.

- i. Permits and Approvals:** PB will identify and assist NCC in obtaining all necessary permits and approvals for the project in a timely manner in order to adhere to the project schedule. Anticipated permits include:

- Department of Natural Resources and Environmental Control (DNREC) permit
- US Army Corps of Engineer (USACE) permit for construction in a designated flood risk zone
- Delaware Department of Transportation (DelDOT) permit to work within the roadway
- Amtrak construction permit or agreement for construction near or within railroad parking areas
- Letter of understanding/approval from owners of utilities within project

- Soil erosion and sediment control permits

If the Contractor is required to obtain certain permits and approvals during construction, PB will indicate such in the construction contract documents.

It is assumed that permitting fees for Phase IIb, Part 1 will be negligible.

#### Task 07 Construction Document Preparation

Table 2 describes the contents for construction document submittals for different design stages.

Table 2 100 Construction Document Submittal Contents

Design submittal	Drawings	Geotechnical Data Report (GDR)	Contaminated site review	Cost estimate	Construction sequence	Specifications and front end documents	Permits/ approvals
100%	✓	✓	✓	✓	✓	✓	✓

- a. **Drawings:** PB is continuing to update the construction drawings to reflect design changes as described above in Section II, Table 1. The drawing sheets as described in Table 3 below are being prepared according to the NCC CADD protocols. Plan and profile sheets have 1:30 horizontal and 1:5 vertical scale. When revising the drawings, PB will incorporate comments from NCC and the independent constructability review. PB will also consider comments received from DelDOT, DNREC, Amtrak, and utility companies.

Table 3 Construction Drawing List of Sheets

Sheet Description
Title sheet with general notes
Abbreviation and legend sheet
Key index sheet with benchmark data
Bypass pumping plan
Pavement replacement schedule
Plan and profile drawings showing: <ul style="list-style-type: none"> <li>• Topographical features, including property lines (JMT mosaic)</li> <li>• Existing sanitary sewers and sewer easements</li> <li>• Existing non-sanitary sewer utilities</li> <li>• Proposed interceptor sewers</li> </ul>
Updated plan and profile drawings showing: <ul style="list-style-type: none"> <li>• Private property connections</li> <li>• Manhole connections</li> <li>• Proposed storm drain replacements <i>[Note: It is assumed that storm drains will only be replaced where the drains fall into the construction trench. This scope does not include major storm drain modifications.]</i></li> <li>• Construction notes</li> </ul>
Manhole details
Typical trench and pipe bedding details
Service lateral detail
Holly Oak Creek crossing detail
Drain crossing near Grubbs Landing Road detail

Sheet Description
Flow diversion chamber details
DelDOT standard details (storm drain inlets, pavement, etc.)
Parkway restoration details (landscaping, tree replacement, etc.)
Soil boring data
Erosion and sediment control detail
Traffic Control Plan

- b. Construction Cost Estimate:** The engineer's opinion of probable construction cost will be provided before the 100 and 100 percent design submittal and also with the 100 percent design submittal. Standard NCC pay items will be used with PB modifications as necessary. The quantity take-offs will be done on a per sheet basis and will include contingencies.
- c. Specifications/Front-end Documents:** Where available, NCC standard specifications and front-end documents will be utilized with modifications to make them project specific. Where needed, PB will create new special provisions using MasterSpec format. When producing the construction contract documents, PB will consider review comments received from utility companies, DelDOT, and other agencies. PB will prepare the bid packages, incorporate contractor comments, and prepare addenda to the bid package.

#### **Task 08 Quality Assurance and Quality Control (QA/QC) and Constructability/Bid Reviews**

- a. QA/QC Review and Constructability/Bid Reviews:** Senior design engineering staff will review the design documents during production and also the 100 percent design documents prior to submitting them to NCC.

PB will coordinate two independent constructability reviews before the 100 percent design stage to be conducted by a vendor (Michael Kerr, per NCC request) who will not be bidding on the project. PB will provide documents to review along with a checklist to use as a guideline for the review. PB will answer questions and respond to recommended changes.

PB's Construction Services Department will also conduct two constructability reviews before the 100 percent design stage. During their review, PB Construction Services will also prepare a draft construction sequence/schedule.

#### **Task 09 RFIs / Pre-bid Meeting and Bid Review**

- a. Respond to Contractor Requests for Information (RFI)/ Pre-bid Meeting and Bid Review:** PB will coordinate with NCC to respond to contractor RFIs.

PB staff will conduct a pre-bid meeting for the project and will review and summarize bids for review by NCC. Included will be a Dunn and Bradstreet review of the low bidder. It is assumed that NCC will provide facilities for the meeting. PB staff will address technical questions and issues from the pre-bid meeting, along with subsequent questions and issues, and prepare the associated addenda for NCC.

#### **Task 10 Public/Regulatory Outreach**

At the direction of NCC, no public meetings are planned for this project. Therefore, this task has been removed from this scope of services.

#### **Subconsultants**

**a. Dye Testing of Sanitary Fixtures: (Compliance EnviroSystems, LLC (CES))**

**b. Sewer Televising (CES)**

**c. Surveying (Johnson, Mirmiran & Thompson (JMT)):**

- Topographical and utility survey
- Easement survey
- Survey stakeout for soil borings

**d. Detailed Geotechnical Survey (TRC):**

- Supplemental soil borings and lab testing
- Contaminated site review and sampling

#### **Vendors**

**a. Independent Constructability Reviews:**

- First design submittal review includes drawings and the *Phase II Basis of Design Report* [limited up to 20 hours at \$100/hour = \$2,000]
- Second design submittal review includes complete set of construction drawings and bid documents [limited up to 32 hours at \$100/hour = \$3,200]

#### **Contingency**

For the purpose of addressing unknown or un-quantified project needs, a contingency in the amount of \$100,000 is included in the budget. This contingency fund can only be used if authorized in writing by NCC.



ENGINEERING DESIGN SERVICES														Total			
Project Manager		Senior Engineering Specialist		Construction Specialist		Senior Engineer		Engineer		CADD							
Hours	\$/hr	Hours	\$/hr	Hours	\$/hr	Hours	\$/hr	Hours	\$/hr	Hours	\$/hr	Hours	Cost				
215.64		230.57		133.27		143.38		94.43		94.12							
SUBCONSULTANTS																	
a. Manhole Inspections (CES)																	
a. Invoice in process for completed inspections																	
b. Diagnostics (CES)																	
a. Sanitary service lateral CTV testing																	
b. Sewer televising (CES)																	
a. Sewer televising																	
b. Surveying (JMT)																	
a. Topographical and utility survey and survey stakeout for soil borings																	
b. Easement survey																	
c. Geotechnical Survey (NCC)																	
a. Supplemental borings, lab testing																	
b. Contaminated site review and sampling																	
TOTAL SUBCONSULTANTS																	
VENDORS																	
Independent Constructability Review (Michael Kerr)																	
a. 80% design review																	
TOTAL VENDORS																	
CONTINGENCY FOR DESIGN																	
TOTAL COST TO COMPLETE = \$993,081																	
TOTAL BUDGET REMAINING IN PHASE II CONTRACT (AS OF AUGUST 28, 2009) = \$416,810																	
TOTAL ADDITIONAL FUNDING REQUESTED = \$576,271																	



**EXHIBIT A – PART 2**

**KNOLLWOOD INTERCEPTORS & TUNNEL PROJECT**

**NEW CASTLE COUNTY, DELAWARE**

**#06P-013**

**SCOPE OF DESIGN ENGINEERING SERVICES**

**October 28, 2009**

This proposed scope is for design engineering services for the Governor Printz Interceptors Project, Design Phase IIb, Part 2 (Knollwood Interceptors & Tunnel Project). The scope includes engineering design of the upstream Knollwood Interceptor segment as developed through consultation with New Castle County (NCC) Special Services Division. Deliverables and task descriptions, followed by a man-hour level of effort (LOE) and bill rate schedule, are provided below. The detailed LOE is used to estimate the overall cost. Distribution of hours may vary based on actual execution and requirements of the project. This budget is intended to represent a not-to-exceed estimate based on the data available. Unforeseen conditions or variables will require modifications to the assumptions made. Any major changes in budget allocations will be communicated with NCC as soon as they are identified. Phase III Construction Management will be included in a separate scope of services at a later date.

**I PROJECT OVERVIEW**

A significant portion of NCC's sewer system is known as the Brandywine Hundred Sewer System (BHSS). Figure 1 shows the BHSS, which encompasses four main sewersheds, including the Naamans, North Delaware, Shellpot, and Brandywine sewersheds. The overall system serves nearly 25,000 properties and consists of approximately 420 miles of sewer lines and three major pump stations. All sewerage flow is conveyed to the Wilmington Wastewater Treatment Plant.

The BHSS was primarily built in the 1940s through 1960s. The aging system experiences extremely high rainfall-induced inflow and infiltration (I/I) resulting from private property connections and structural defects. The system has two relief structures upstream of the Naamans and Stoney Creek Pump Stations, which discharge to the Lower Naamans Creek and the Delaware River, respectively, during heavy rainfalls.

In the late 1990s, NCC began to plan for increased replacement, rehabilitation, and maintenance efforts for the entire system. By 2000, NCC recognized that significant work was needed to address age-related deterioration and insufficient capacity.

In 2002, the Department of Natural Resources and Environmental Control (DNREC) and NCC proactively developed a Secretary's Order to facilitate a timely and cost effective solution to problems in the BHSS. In accordance with the Order, NCC committed to rehabilitate the sewer system and eliminate regular overflows. This Order was signed on October 7, 2003.

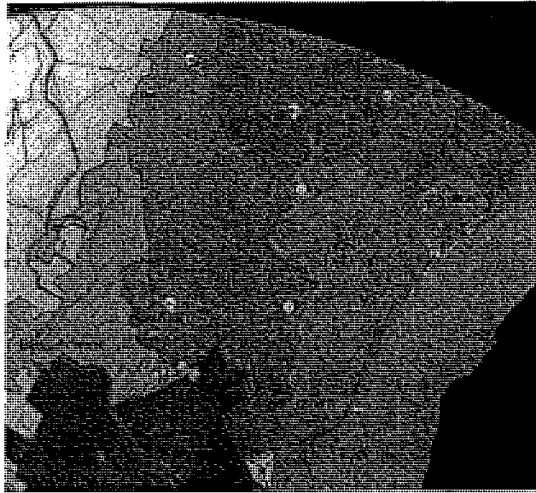


Figure 1 Brandywine Hundred Sewersheds

In October 2004, NCC developed a Combined Sewer Overflow (CSO) Elimination Plan. As part of the plan, NCC is implementing an I/I Reduction Program and has initiated several projects including upgrades to the Stoney Creek Pump Station (SCPS) and two interceptor sewer replacement projects. The North Delaware Interceptor Project is located downstream of the SCPS and is under construction. This project involves design for the Governor Printz Interceptors (GPI) Project, which is located upstream of the SCPS, within the Naamans and North Delaware sewersheds.

Figure 2 shows the location of the GPI Project. The interceptors convey sewerage flow to the SCPS from:

- Naamans Interceptor
- Old Naamans Interceptor
- Naamans Pump Station forcemain
- Knollwood Interceptor
- Rolling Park Interceptor

The GPI Project includes three phases:

- Phase I evaluated the condition and capacity of the existing interceptors and examined alternatives to alleviate problems and prevent overflows. Recommendations were presented in the *Governor Printz Interceptors Preliminary Basis of Design Report (BODR)*, dated January 2008.
- Phases II includes detail design. Phases II & IIb, Part 1 includes replacement of the downstream GPIs, located within Governor Printz Boulevard and Governor Printz Boulevard Extended, between Stoney Creek and Manor Avenue; and along the ditch parallel to Interstate Highway I-495, up to the I-495 crossing near the Myrtle Avenue Bridge. (Additional detail is provided in the *Phase II BODR*, dated August 2009.) Phase IIb, Part 2 includes replacement of the Interstate Highway I-495 sewer crossing, west of the Myrtle Avenue Bridge, a railroad crossing southeast of Myrtle Avenue, and the Knollwood Interceptor, as shown in Figure 3
- Phase III includes construction.

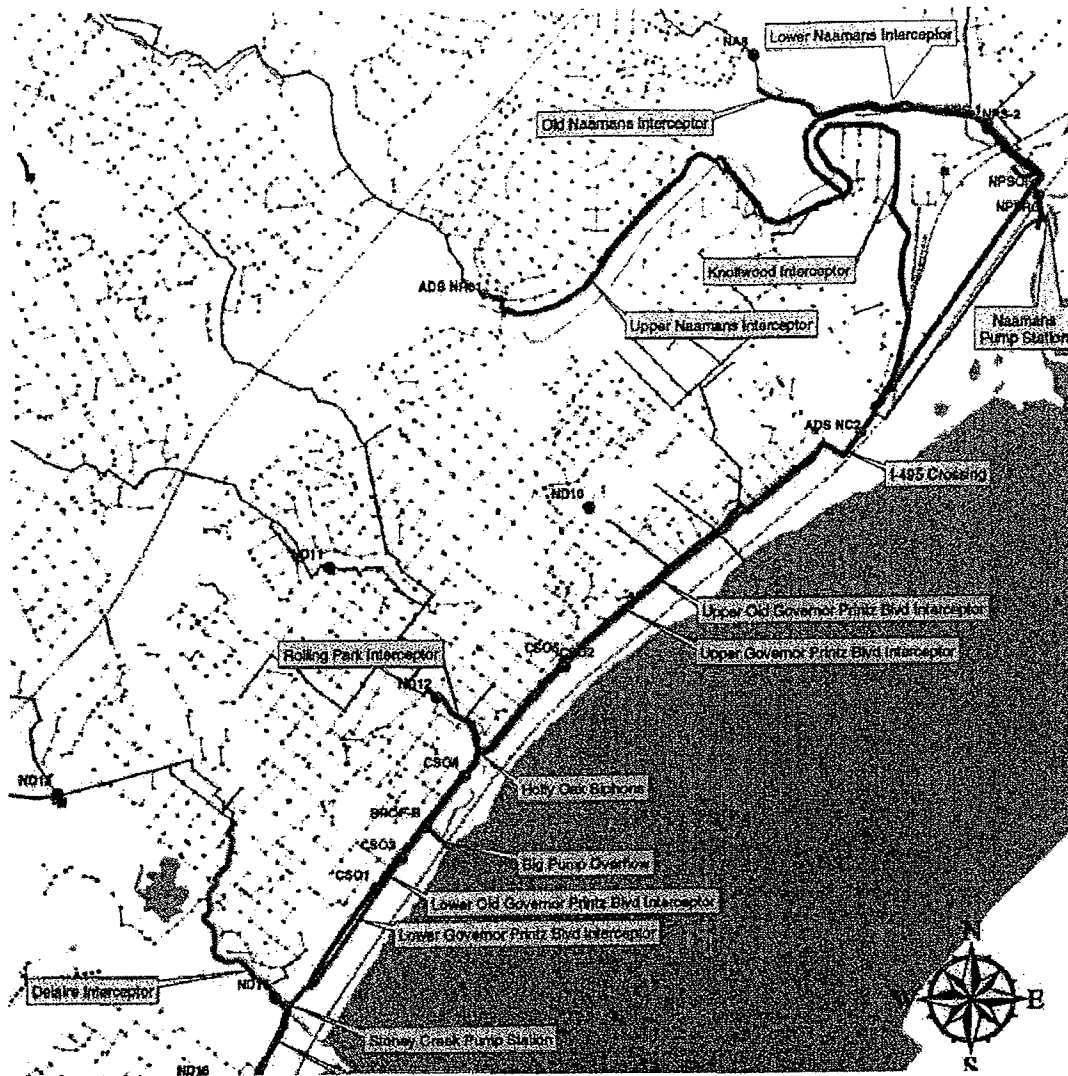


Figure 2 Governor Printz Interceptors Project Location

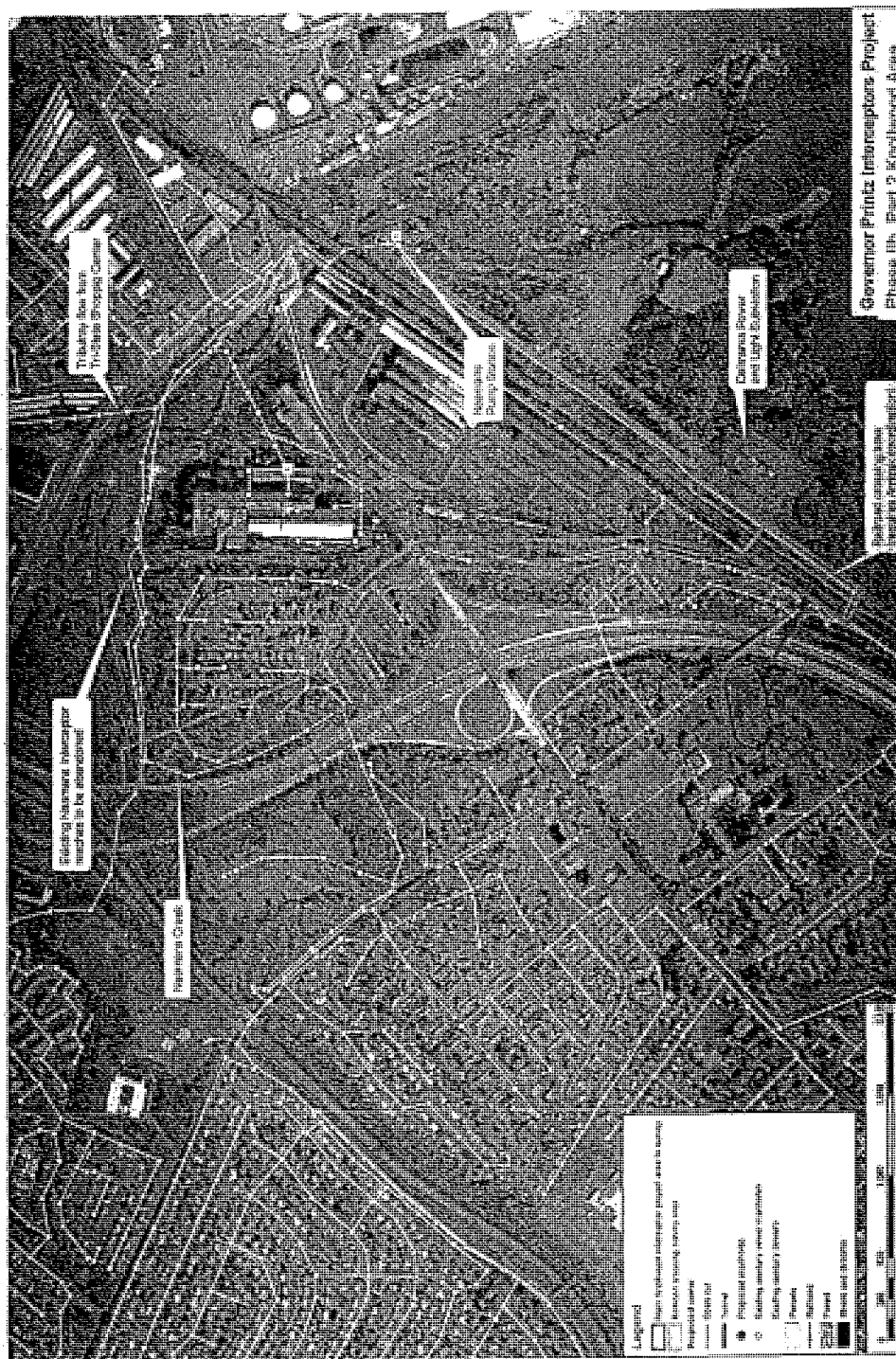


Figure 3 Knollwood Interceptors Project Location

## **II PHASE IIb, Part 2 DESIGN NOTES**

*Notes for the Phase IIb, Part 2, Knollwood & Tunnel Project Design include:*

- 1. Because the Phase II, Part 1 segment primarily involves open-cut trenching, the tunneling portion under Interstate Highway I-495 has been incorporated into the Phase IIb, Part 2 Knollwood Design, which requires tunneling in several locations.*
- 2. Detailed design for the flow diversion chamber near Myrtle Avenue is included in the Phase IIb, Part 2 design because the location and dimensions are dependent upon whether a single or dual interceptor system is selected for the proposed Knollwood interceptor.*
- 3. This scope of services assumes that a gravity sewer will be constructed under Naaman's Creek (i.e. no siphon structures will be required).*
- 4. It is assumed that the portion of the existing Naaman's Interceptors, between Interstate Highway I-495 and Ridge Road (west of the tributary sewer from the Tri-State Shopping Center) will be abandoned as part of this project.*
- 5. This scope does not include work on the interceptors near Naamans Road, northwest of the Naamans Pump Station, or along the railroad tracks, between the pump station and the Delmarva Power and Light substation.*
- 6. This scope does not include analysis or replacement of the Interstate Highway I-495 interceptor crossings at Marion Avenue, Everett Avenue, and Interstate Highway I-95.*

## **III DELIVERABLES**

PB will submit the following deliverables according to the Phase IIb, Part 2 project schedule:

- Easement plat drawings
- Fish and wildlife (endangered species) study
- Historical/archaeological site review memorandum
- Geotechnical design memorandum(s)
- *Phase IIb, Part 2 Basis of Design Report*
- List of permits and approvals required
- 30, 60, 90, and 100 percent construction document submittals as described in Table 1.

Table 1 30, 60, 90, and 100 Percent Construction Document Submittal Contents

Design submittal	Drawings	Geotechnical Data Report (GDR) and Geotechnical Baseline Report (GBR)	Contaminated site review	Cost estimate	Construction sequence	Specifications and front end documents	Permits/ approvals
30%	✓						
60%	✓	✓	✓	✓	✓		
90%	✓	✓	✓	✓	✓	✓	✓
100%	✓	✓	✓	✓	✓	✓	✓

Senior PB staff will review all submittals prior to delivering them to NCC.

#### IV TASK DESCRIPTIONS

##### Task 00 Project Management

PB is responsible for management of staff and subconsultants as well as tasks related to project administration, including preparation of work plans, preparation of schedule and updates, bi-monthly progress meetings, and monthly progress reports.

##### Task 01 Easements/Private Property Coordination

- a. **Mailing:** PB will prepare one project mailing to inform owners of private properties within the Phase IIb, Part 2 project boundary that crews will be within the area to collect field data for design of the new sanitary sewer interceptor.
- b. **Access Permissions:** PB will coordinate obtaining permissions to access private properties along the proposed sewer alignment. Permission, by phone calls, may be required for investigations, including surveying, geotechnical data collection, manhole inspections, and private property sanitary sewer dye testing.
- c. **Dye Testing:** PB will coordinate dye testing of sanitary fixtures for private properties adjacent to multiple sewers to identify connectivity. The fieldwork for this effort will be provided through a subconsultant (CES). It is assumed that dye testing will not extend beyond 15 properties.
- d. **Easements:** The scope of services for the Phase IIb Part 1 Design includes PB coordination for preparation of plat drawings for required permanent sewer easements and temporary construction easements for impacted properties along Governor Printz Boulevard as well as the property near Myrtle Avenue, where a potential flow diversion chamber may be required. PB's scope of services for Phase II, Part 2 Design currently does not include any easement work. If during the design process, it is determined that additional easements (e.g., from CitiSteel) are required upstream of the chamber near Myrtle Avenue, PB will request additional budget to provide such services.

*[Note: This scope does not include work associated with private property inflow and infiltration (I/I) removal. If requested by NCC, PB will prepare a separate scope of services for this task.]*

#### **Task 02 Physical Condition/Connectivity Verification/Sewer Televising**

- a. Sanitary Manhole Inspections:** There are approximately 50 existing sanitary manholes within the project area as shown in Figure 3. PB will coordinate physical inspections of these manholes by a subconsultant (CES). It is anticipated that approximately 30 of these manholes will be abandoned or removed during construction and will only be inspected for invert elevations and connectivity. It is assumed that approximately 20 manholes may be kept and will be inspected for condition as well as invert elevations and connectivity. This scope includes a contingency for investigations of an additional 10 manholes. It is estimated that the existing manholes are between 10 and 60 feet deep. To reduce costs, it is proposed that most of the manholes will be inspected using a rod-mounted camera, with only the deeper manholes being inspected by physical entry.

Any required manhole entries will be confined space entries. It is assumed that all entries will require mechanical ventilation, harnesses, gas detection, observers, and associated confined space entry requirements. The use of full safety gear short of supplied air has been assumed. Flow control will be performed as required to minimize service impacts in accordance with protocols established by NCC. Manhole inspections may require some preparation work such as clearing brush. Access to the manholes, flow control and brush clearing will be the responsibility of the subcontractor assisting with inspections. It is assumed that NCC will assist in locating manholes if needed and NCC will provide water for cleaning and disposal of site debris.

- b. Sewer Televising:** PB will coordinate televising of existing sewers by a subconsultant (CES). Existing sewers to be kept to convey flow from service lateral connections will be televised to determine the condition of the sewer. Where new service laterals/sewers are required, the existing sewers will be televised to determine the locations of service connections that will need to be rerouted. PB will review the DVDs and provide a written report documenting sewer condition and service lateral locations.

*[Note: This work scope does not include any sewer rehabilitation design. If rehab work is required, PB will prepare a separate scope of services for this task.]*

#### **Task 03 Land Survey**

- a. Topographical and Buried Utility Survey:** PB will coordinate obtaining a topographical survey, including contours and land features such as trees with 18-inch or larger diameters within the survey boundary shown in Figure 3. The subconsultant (JMT) is also to perform a buried services survey to locate all utilities and subsurface infrastructure within the bounded survey route, including storm drains, but not sanitary sewers, which will be inventoried by a different subconsultant (CES). The subconsultant (JMT) is to collect sanitary manhole rim elevations. In addition, the subconsultant (JMT) will mark proposed soil boring locations and will witness as-drilled boring locations.
- b. Delineate Environmentally Sensitive Areas:** PB will delineate environmentally sensitive areas, including forests, wetlands, and flood zones. PB will also conduct a preliminary assessment using online resources from U.S. Fish and Wildlife Service Chesapeake Field Office. If required, PB will prepare and send a letter, project description, and mapping,

requesting the Chesapeake Field Office review project activities to determine if the proposed project would have any impact to Federally-listed threatened and endangered species. PB will also send a request to Delaware Natural Heritage Program to determine if any record of rare, threatened, or endangered species or natural communities exists in their database. Additionally, PB will coordinate with the National Marine Fisheries Service to determine if the proposed project will require an Abbreviated or Expanded Essential Fish Habitat Assessment. A copy of the environmental review will be provided to NCC for review. Should additional work, such as directed surveys, field meetings with resource agency personnel, rerouting the sewer alignment, or making provisions for habitat protection be required, PB will discuss additional scope of services with NCC.

- c. **Historical/Archaeological Site Review:** PB will review the State of Delaware Department of Natural Resources and Environmental Control (DNREC) database for historical and archaeological sites. It is not anticipated that historical or archeological permitting or special consideration will be required for this project. PB will prepare a technical memorandum summarizing results.
- d. **Contaminated Site Review and Sampling:** The project area may include pockets of contamination in the soil due to previous industrial activity in the area. PB will coordinate an environmental site assessment to be performed by a subconsultant (TRC). A cost allowance is included for six soil samples. The environmental site assessment report will be included with the contract documents.

It is not anticipated that soil contamination will be a major factor in the design or construction of the selected proposed sewer alignment. If contamination is encountered and further analyses or design changes, such as shifting the proposed sewer alignment, are required, then NCC will be contacted and additional scope of services will be assessed. *[Note: If contamination is encountered, the type of contamination and relevant issues will need to be determined, such as the chemical compounds and the risk to the construction process (e.g., contaminated groundwater plume migration, etc.) and appropriate measures will need to be incorporated into the bid documents to address contamination issues, such as dewatering restrictions or allowances for contaminated soil.]*

#### **Task 04 Geotechnical and Tunnel Engineering**

- a. **Geotechnical Investigation Plan:** Subsurface site conditions for the Knollwood section will be assessed utilizing geophysical investigative techniques (including seismic refraction), soil and rock borings, and laboratory testing. Subcontractors will be used to perform the geophysical investigations and borings under PB's oversight. PB will develop investigation plans that include the location, type and depth of investigation, and type of sampling or in-situ testing to be performed. The plan will also include locations for groundwater monitoring wells.

It is anticipated that much of the proposed tunnel alignment may be through bedrock. Based on preliminary research and discussions of similar projects, it may be feasible for the contractor to tunnel this segment with a rock tunnel boring machine (TBM) rather than a microtunnel TBM. PB believes there could be cost, schedule, and constructability advantages to using a rock TBM instead of a microtunnel TBM, but additional subsurface information regarding rock fracture spacing and rock mass permeability would be needed to evaluate the feasibility of using a rock TBM. Therefore, additional investigative effort, including pressure testing (packer testing) of the rock formation and rock mapping of



outcrops in the area is proposed. This additional data may result in more flexible and competitive tunneling methods being considered feasible, and may therefore result in more competitive bids for construction.

- b. **Preliminary Geotechnical Assessment (Seismic Refraction Study):** Subsurface site conditions will be assessed utilizing geophysics methods such as seismic refraction or other appropriate technology to identify bedrock depths and outcroppings along the proposed interceptor sewer alignment. The geophysics investigation will be performed over the entire alignment to obtain an estimated profile of the top of bedrock. This bedrock profile will be used in planning the boring investigations to target specific areas of interest along the alignment. The seismic refraction study will be provided by a subconsultant (Enviroscan or other). Bedrock outcrops in the area will be mapped by a Professional Geologist in order to develop rock mass ratings to be used in characterizing the rock mass for tunneling.
- c. **Management and Oversight of Geotechnical Investigation:** PB will provide management and oversight of the subsurface investigation program. Oversight will include site visits prior to and during the investigations, coordinating with the subcontractors and other stakeholders to obtain permits and access, laying out borings in the field, managing schedules, reviewing invoices, and performing supervision and monitoring of field drilling operations. PB oversight of field drilling operations will include directing sampling locations, depths, types, procedures, and backfilling and restoration needs, as well as logging and classifying the recovered samples. The geotechnical investigation will be carried out in accordance with the current industry practice and PB's approved geotechnical and tunneling quality manual as required by the firm's ISO 9000 certification.

The drilling and sampling program will consist of rotary wash borings advanced through soil, boulders, and bedrock to appropriate depths for design. Soils will be sampled using standard penetration testing (SPT) and thin-walled samplers. Boulders and bedrock will be cored using double-tube coring methods. Recovered samples will be classified and logged by a representative of PB. Recovered samples will be stored and transported back to a laboratory for additional follow-up testing. Rock along the tunnel alignment will be pressure tested in order to estimate the rock mass permeability and possible groundwater inflows into the tunnel during construction. Borings will be performed at manhole or tunnel shaft locations and other critical locations for the tunneling and open trench operations. Groundwater levels will be measured during and following drilling operations. Groundwater monitoring wells will be installed at select locations to obtain accurate long-term water level readings. The drilling and sampling operations will be performed in level D personal protection by a subconsultant. If environmental contaminants are encountered in a boring, the boring will be terminated and grouted and NCC will be notified. A limited amount of environmental sampling is included in this scope under Task 03.d. If environmental investigation and sampling beyond Task 03.d is needed, PB will provide a supplemental proposal to address the required services.

- d. **Laboratory Testing:** Recovered soil and rock samples will be tested by a subconsultant in an AASHTO accredited testing laboratory. Laboratory soil testing will be performed to verify field classifications, determine natural water contents, and determine engineering properties including shear strength, corrosivity, and deformation potential that may affect the installation or design of the proposed pipeline. Recovered rock samples will be tested for engineering properties that will be relevant to the construction methods, including compressive and tensile strength, elastic properties, and abrasivity. PB will develop the laboratory testing program including determining which samples to be tested and types of

testing to be performed. PB will review the results for quality control and incorporate the results into the final boring logs.

- e. **Supplemental Investigation (Test Pits, Additional Borings, etc.):** An allowance is included for a supplemental investigation of specific areas of interest. PB will plan and perform an additional supplemental investigation as appropriate based on the results of the soil and rock borings, geophysics, and rock mapping. This supplemental investigation may include test pits to investigate boulders or the bedrock surface, sonic borings to obtain additional continuous sample data, additional soil and rock borings, or other types of investigation and testing. The supplemental investigation will be performed at select locations along the proposed sewer alignment in order to investigate potential problem areas and reduce construction cost risk to NCC. PB will provide oversight and will prepare logs of the supplemental investigation operations. The drilling or test pit investigations will be performed by a subconsultant. If subsurface conditions, as determined by the borings, are significantly different or variable to the extent that the supplemental investigation allowance is not sufficient, PB will present investigation findings and the project needs to NCC for discussion of possible additional scope and budget.
- f. **Geotechnical Data Report (GDR):** PB will prepare a GDR presenting the results of the subsurface investigations and laboratory testing. The GDR will include final typed boring logs, results of field and laboratory tests, rock mass mapping results, photographs of recovered rock cores, and groundwater monitoring data. Relevant historic information will also be included. The GDR will be a factual report that presents data only for inclusion as information in the contract documents; no interpretations or recommendations will be included.
- g. **Geotechnical Analysis and Design of Cut-and-Cover and Tunnel Pipe Segments:** This scope of services assumes that two parallel interceptor sewer pipes, each within separate steel casings, will be constructed under Interstate Highway I-495 southwest of Myrtle Avenue and a single casing pipe will be tunneled under the railroad tracks and north of Philadelphia Pike. The single casing pipes will be sized to carry two sewer pipes if necessary. It is anticipated that the sewer between Myrtle Avenue and Philadelphia Pike will be open-cut.  
  
Subsurface soil, rock, and groundwater data will be analyzed to provide recommendations for the proposed interceptor sewer alignment. The subsurface data will be interpreted and evaluated to determine external loading conditions for both tunnel and cut-and-cover pipe segments during construction and after construction. The potential for settlement, heave, or vibration-induced damage during excavation or tunneling will be evaluated. The potential for post-construction settlement will be evaluated as well. The need for ground improvements and instrumentation and monitoring will also be evaluated. External geotechnical design loads for both hard rock and/or soft ground conditions will be provided to the contractor and pipe manufacturer for the structural design of the pipe. A constructability review for the tunneling operations will be performed.
- h. **Geotechnical Analysis and Design for Manholes, Special Structures, and Tunnel Shafts:** PB will analyze subsurface external loads for proposed manholes, structures, and tunnel shafts. Design loads will be analyzed for two conditions; soft ground and rock. These two design conditions will be used throughout the project where new manholes or structures are required. Geotechnical design loads will be provided to the contractor and manufacturer for the structural design of the manholes, structures, and tunnel shafts.

- i. Geotechnical Design Memorandum(s):** PB will prepare geotechnical design memorandum(s) for internal project team use that will present a summary of the subsurface conditions encountered, laboratory testing results, interpretations of anticipated subsurface conditions and ground behavior, and recommendations for design and construction. The results of the geophysics investigation and report will include interpretations regarding depth and hardness of bedrock; and therefore, these results will be presented and discussed in the geotechnical design memorandum, and not in the GDR.
- j. Geotechnical Baseline Report (GBR):** PB will prepare a GBR that will be incorporated into the contract documents. The intent of the report will be to present a quantifiable measure of anticipated ground conditions, such as the likely number and size of boulders or amount of mixed face conditions. Focus will be on tunnel areas to aid with risk allocation and provide uniformity of bids.
- k. Geotechnical Specifications and Estimates Relating to Excavations:** Geotechnical specifications and quantity/cost estimates will be prepared based on geotechnical investigations. Special provisions will be prepared for open cut-excavations, tunnel excavations, dewatering, and ground condition instrumentation and monitoring.
- l. Geotechnical Profile Sheets:** Geotechnical profile sheets, including final boring logs, will be developed for inclusion in the contract documents.

#### **Task 05 Hydraulic Modeling**

- a. Update Existing Hydraulic Model:** In compliance with the Department of Natural Resources and Environmental Control's (DNREC) Secretary's Order to address problems within the Brandywine Sewer System, NCC's Program Manager, Malcolm Pirnie (MP) developed a hydraulic model of the county's sewer system using XP Storm Water Management Model (XP SWMM) Software.

It is assumed that the same model version given to PB for the Phase II, Part 1 Design will be used for the Phase IIb, Part 2 Design and that no additional effort is required to validate the model. PB will update the model to include the proposed interceptor configuration and will run the model to verify that the proposed design meets the requirements for the 3-year, 24-hour design storm condition provided by MP. This will include evaluating the capacity of local sewers discharging directly to the Knollwood Interceptor. [The estimated number of runs for the design condition is two; one for the design dry weather flow condition and one for the design wet weather flow condition.]

In addition, the model will be used to assess the impacts and potential hydraulic concerns associated for the following rainfall events:

- July 12, 2004 storm event
- 5-year, 24-hour Soil Conservation Service (SCS) storm event
- 10-year, 24-hour SCS
- 25-year, 24-hour SCS

Hydraulic gradeline (HGL) profiles will be prepared for each of the runs and results will be incorporated into the *Phase IIb, Part 2 Basis of Design Report*.

#### Task 06 Detailed Design Services

The proposed interceptor sewer, including highway, railroad and stream crossings will be designed per NCC standards and in accordance with Delaware Department of Transportation (DelDOT), Amtrak, DNREC, and US Army Corps of Engineer (USACE) requirements.

*[Note: It is assumed that the structural analysis and design of the interceptor sewer pipe, manholes, and special structures, including flow diversion or other chambers, will be the responsibility of the manufacturer. PB will provide preliminary, non-structural, design layout details in the construction drawings and will provide external loading requirements based on geotechnical considerations in the contract specifications. Should NCC request a more detailed structural review and design effort, additional scope and budget will be negotiated.]*

- a. **Civil Engineering Design:** This task includes all elements of civil design required to establish the proposed interceptor sewer configuration, including determining required pipe elevations, sizes, and capacities, and addressing utility conflicts.

An initial site visit will be performed to review the project area and walk the alignment of the Knollwood Interceptor to assess site limitations and interconnections. It is assumed that NCC will provide a representative to accompany PB during the initial site visit. PB will also visit the site while subconsultants are performing surveying, geotechnical investigations and manhole inspections. PB will walk along and photograph the proposed interceptor sewer alignment. A total of six site visits are anticipated during the course of the design.

PB will review alternatives considered for the new interceptor sewer alignment in the *Phase I Preliminary Basis of Design Report* and will perform a thorough analysis of the selected alternative and options to refine the alignment. A general layout map of the project area with existing and proposed sewers will be prepared and the feasibility of the proposed route will be assessed with consideration of:

- Zoning and possible future roads/developments that may affect routing (PB will inquire with NCC's Land-use and Planning Department and with CitiSteel.)
- Existing sewer horizontal and vertical alignments per asbuilt drawings
- Design constraints
- Open cut and tunnel sections

Single and dual pipe options will be evaluated for the proposed interceptor alignment. Calculations will be done using a Microsoft Excel spreadsheet, using design dry and wet weather flows for the 3-year, 24-hour design storm condition as provided by NCC's Program Manager, Malcolm Pirnie (MP).

The proposed design includes tunneling under the railroad tracks near Myrtle Avenue to tie into the existing forcemain from Naamans Pump Station. The proposed sewer under the tracks will be encased within a steel casing. A second parallel pipe will be placed within the casing. This second pipe will be designed as a potential overflow pipe to a potential future storage tank, located southwest of the railroad crossing. *[Note: Hydraulic analysis of the Naamans Pump Station and downstream forcemain are not included with this scope of services. If requested by NCC, additional scope and budget will be negotiated for this task.]*

*[Note: Per NCC request, PB will provide a stub for a potential future storage facility. However, the actual siting and design of any offline storage facility is not anticipated to be*

*included in the current scope of services. Should NCC require a more detailed review and design effort, additional scope and budget will be negotiated.]*

A preliminary design will be prepared for a potential flow diversion chamber north of Everett Avenue. Design changes for the flow diversion chamber near Myrtle Avenue will be evaluated. Calculations for weir and chamber dimensions will be done using a Microsoft Excel spreadsheet, using design wet weather flows from the Naamans interceptor and Naamans forcemain provided by MP. *[Note: The detailed design for the flow diversion chamber near Myrtle Avenue is included in the Phase IIb, Part 2 Design scope because the dimensions are dependent upon whether a single or dual interceptor system is selected for the proposed Knollwood interceptor.]*

- b. Phase IIb, Part 2 Basis of Design Report (BODR):** A BODR for the Knollwood area will be prepared. The report will include the proposed interceptor alignment and a summary of hydraulic calculations, including hydraulic model results, and descriptions of design constraints. The report will be reviewed by a PB senior engineer for quality assurance and quality control and will be presented to NCC prior to developing CADD drawings.
- c. Private Property Service Connections:** PB will investigate the locations where existing sewers may be kept to service private properties and connected to the proposed interceptor sewer system at appropriate manholes. Where keeping the existing sewers to service properties is not feasible, service laterals will be rerouted from the old sewer system to new manholes along the proposed interceptor sewer. PB will use results from the sewer televising and private property sanitary fixture dye testing to design service lateral reconnections. *[Note: NCC sewer standards require that, for sewers 15 inches and larger in diameter, private property service laterals shall connect to manholes and not directly to the sewers.]*
- d. Storm Drain Modifications:** This task includes review of existing storm drains that might interfere with the proposed sewer lines. PB will assess required changes in the storm drainage system to resolve conflicts with the proposed sanitary sewer alignment. In the event that permitting or site conditions require major modifications, additional scope and budget will be negotiated with NCC.
- e. Utility Coordination/Conflict Resolution:** PB will coordinate with various utility companies to review construction impacts on existing utilities. PB will utilize the buried utility survey to route the proposed interceptor sewer alignments to minimize conflicts with existing utilities. PB will meet with utility representatives in the field as necessary to coordinate requirements for protection of utilities during construction. Construction drawings and special provisions for utility support will be submitted to the appropriate utility companies for their review. Meetings and discussions with the utilities are to be documented and copied to NCC within one week of the meeting. *[Note: It is assumed that any required utility relocation will be the responsibility of the utility owner.]*
- f. Traffic Study:** PB will complete a traffic study to meet the requirements for a Transportation Management Plan (TMP) in accordance with DelDOT's Work Zone Safety and Mobility Policy and Procedures for work impacting state roadways. The traffic study will address potential impacts to traffic from active work zones at the following locations:
  - At the entrance to the SEPTA Park & Ride lot south of Myrtle Avenue
  - Along Alcott Avenue and Everett Avenue

PB work items associated with the traffic study include:

- Coordination with the design team regarding construction strategies and the scope of impact to normal traffic operations. This will include detailed consideration of how the Interceptor will be constructed, with regards to the size of the construction zone and trench width, taking the most recent design guidance into consideration. From this information, work zone typical sections will be developed to determine requirements for lane closures and recommendations for long-term work zone traffic control (WZTC) measures.
- Collection of traffic data including peak hour traffic volumes at the entrance to the Park & Ride, and along Alcott Avenue north of Philadelphia Pike.
- Establishing requirements for WZTC and constraints based on traffic demand and formulating preliminary WZTC strategy.
- Preparing report documenting TMP elements at proposed WZTC sites, including existing traffic conditions, construction impacts, and proposed WZTC measures. The report will be distributed to NCC, NCC's Safety Officer, and DelDOT's Traffic Division.
- Meeting with NCC's Safety Officer and DelDOT's Traffic Division for review and approval of the Knollwood Interceptor TMP.
- Preparation and distribution of a Memorandum of Understanding between NCC and DelDOT with regards to the TMP requirements for the Knollwood Interceptor.

The traffic study will be completed concurrent with the 60 percent design submittal. Addressing DelDOT requirements for the TMP that extend beyond the items noted in this scope and changes to or additional areas requiring WZTC identified during the design phase shall constitute extra work.

- g. Traffic Control Plan:** PB will develop a Traffic Control Plan for the construction work in accordance with DelDOT standards and requirements. The traffic control plan will be used in the permitting process and the approved plan will be included in the contract documents. The Traffic Control Plan will be incorporated into the 60, 90, and 100 percent design submittals. Specific elements to be included in each milestone submission are as follows:

The 30 percent submittal will consist of the TMP.

The 60 percent submittal will include Maintenance of Traffic Plans (MOT), specifications, and estimate including:

- General Notes
- Sequence of construction, based on a breakdown of construction phasing for MOT
- WZTC details for each phase of construction noting proposed location of channelizing devices (cones or drums), limits of work zone, flaggers, temporary pavement markings, temporary signs, temporary paving, barricades, barriers, and flow arrows indicating active traffic lanes.
- Special provisions and specifications specific to MOT
- Engineers estimate of MOT items.

The 90 and 100 percent design submittals will incorporate comments and revisions from the 60 and 90 percent design reviews.

PB will provide on-going coordination with DelDOT to solicit and respond to agency input regarding detailed requirements for WZTC setups.

**h. Permits and Approvals:** PB will identify and assist NCC in obtaining all necessary permits and approvals for the project in a timely manner in order to adhere to the project schedule. Anticipated permits include:

- Department of Natural Resources and Environmental Control (DNREC) permit
- US Army Corps of Engineer (USACE) permit for construction in a designated flood risk zone
- Delaware Department of Transportation (DelDOT) permit to work within the roadway
- Amtrak construction permit or agreement for construction near railroad and/or associated parking areas
- Letter of understanding/approval from owners of utilities within project
- Soil erosion and sediment control permits

If the Contractor is required to obtain certain permits and approvals during construction, PB will indicate such in the construction contract documents.

An allocation of \$60,000 is included for a railroad occupancy permit from Amtrak. It is assumed that all other permitting fees for Phase IIb, Part 2 will be negligible.

#### **Task 07 Construction Document Preparation**

Table 1 describes the contents for construction document submittals for different design stages.

**Table 1 30, 60, 90, and 100 Percent Construction Document Submittal Contents**

Design submittal	Drawings	Geotechnical Data Report (GDR) and Geotechnical Baseline Report (GBR)	Contaminated site review	Cost estimate	Construction sequence	Specifications and front end documents	Permits/ approvals
30%	✓						
60%	✓	✓	✓	✓	✓		
90%	✓	✓	✓	✓	✓	✓	✓
100%	✓	✓	✓	✓	✓	✓	✓

- a. Drawings:** The drawing sheets as described in Table 2 below are being prepared according to the NCC CADD protocols. Plan and profile sheets have 1:30 horizontal and 1:5 vertical scale. When revising the drawings, PB will incorporate comments from NCC and the independent constructability review. PB will also consider comments received from DelDOT, DNREC, Amtrak, and utility companies.

Table 2 Construction Drawing List of Sheets

Sheet Description	Design Stage	
	30%	60%
Title sheet with general notes	✓	✓
Abbreviation and legend sheet	✓	✓
Key index sheet with benchmark data	✓	✓
Bypass pumping plan		✓
Pavement replacement schedule		✓
Plan and profile drawings showing: <ul style="list-style-type: none"> <li>• Topographical features, including property lines (JMT mosaic)</li> <li>• Existing sanitary sewers and sewer easements</li> <li>• Existing non-sanitary sewer utilities</li> <li>• Proposed interceptor sewers</li> </ul>	✓	✓
Updated plan and profile drawings showing: <ul style="list-style-type: none"> <li>• Private property connections</li> <li>• Manhole connections</li> <li>• Proposed storm drain replacements <i>[Note: It is assumed that storm drains will only be replaced where the drains fall into the construction trench. This scope does not include major storm drain modifications.]</i></li> <li>• Construction notes</li> </ul>		✓
Manhole details		✓
Typical trench and pipe bedding details		✓
Service lateral detail		✓
Naamans Creek crossing detail	✓	✓
Flow diversion chamber details	✓	✓
DelDOT standard details (storm drain inlets, pavement, etc.)		✓
Parkway restoration details (landscaping, tree replacement, etc.)		✓
Soil boring data		✓
Erosion and sediment control detail		✓
Traffic Control Plan		✓

- b. Construction Cost Estimate:** The engineer's opinion of probable construction cost will be provided with the 60, 90, and 100 percent design submittals. Standard NCC pay items will be used. The quantity take-offs will be done on a per sheet basis and will include contingencies.
- c. Specifications/Front-end Documents:** Where available, NCC standard specifications and front-end documents will be utilized with modifications to make them project specific. Where needed, PB will create new special provisions using MasterSpec format. When producing the construction contract documents, PB will consider review comments received from utility companies, DelDOT, and other agencies. PB will prepare the bid packages, incorporate contractor comments, and prepare addenda to the bid package.



**Task 08 Quality Assurance and Quality Control (QA/QC) and Constructability/Bid Reviews:**

- a. **QA/QC Review and Constructability/Bid Reviews:** Senior design engineering staff will review the 30, 60, 90, and 100 percent design documents prior to submitting them to NCC.

PB will coordinate an independent constructability review at the 30 and 60 percent design stages and a constructability/bid review at the 90 percent design stage to be conducted by a vendor (Michael Kerr, per NCC request) who will not be bidding on the project. PB will provide documents to review along with a checklist to use as a guideline for the review. PB will answer questions and respond to recommended changes.

PB's Construction Services Department will also conduct a constructability review at the 30 and 60 percent design stages and a constructability/bid review at the 90 percent design stage. It is anticipated that there will be one site visit per review. During their review, PB Construction Services will also prepare a draft construction sequence/schedule.

**Task 09 RFIs / Pre-bid Meeting and Bid Review**

- a. **Respond to Contractor Requests for Information (RFI)/ Pre-bid Meeting and Bid Review:** PB will coordinate with NCC to respond to contractor RFIs.

PB staff will conduct a pre-bid meeting for the project and will review and summarize bids for review by NCC. Included will be a Dunn and Bradstreet review of the low bidder. It is assumed that NCC will provide facilities for the meeting. PB staff will address technical questions and issues from the pre-bid meeting, along with subsequent questions and issues, and prepare the associated addenda for NCC.

**Task 10 Public/Regulatory Outreach**

At the direction of NCC, no public meetings are planned for this project. Therefore, this task has been removed from this scope of services.

**Subconsultants**

- a. **Dye Testing of Sanitary Fixtures (Compliance EnviroSystems, LLC (CES))**
- b. **Sewer Televising (CES)**
- c. **Surveying (Johnson, Mirmiran & Thompson (JMT)):**
- Topographical and utility survey and survey stakeout for soil borings. [Does not include easement survey.]
- d. **Sanitary Manhole Inspections (CES)**
- e. **Initial Geotechnical Survey (Enviroscan or Other):**
- Seismic refraction study

**f. Detailed Geotechnical Survey (TRC):**

- Soil borings and lab testing
- Perform supplemental investigation (borings, test pits, etc.)
- Contaminated Site Review and Sampling

**Vendors**

**a. Independent Constructability Reviews:**

- 30 percent design submittal review includes drawings and the *Phase IIb, Part 2 Basis of Design Report* [limited up to 20 hours at \$100/hour = \$2,000]
- 60 percent design submittal review includes drawings, *Geotechnical Baseline Report*, preliminary cost estimate, and preliminary construction sequence [limited up to 20 hours at \$100/hour = \$2,000]
- 90 percent design submittal review includes complete set of construction drawings and bid documents [limited up to 32 hours at \$100/hour = \$3,200]

**Contingency**

For the purpose of addressing unknown or un-quantified project needs, a contingency in the amount of \$100,000 is included in the budget. This contingency fund can only be used if authorized in writing by NCC.

V. MAN-HOUR LEVEL OF EFFORT/COST ESTIMATE  
KNOLLWOOD INTERCEPTORS & TUNNEL PROJECT

ENGINEERING DESIGN SERVICES																							Total			
Task 00	Project Management	Project Manager			Senior Engineering Specialist			Construction Specialist			Senior Engineer			Engineer			CADD			Total						
		Hours	\$/hr	Cost	Hours	\$/hr	Cost	Hours	\$/hr	Cost	Hours	\$/hr	Cost	Hours	\$/hr	Cost	Hours	\$/hr	Cost							
Task 00	Project Management	a. Work plans	32	\$8,900	\$16	\$3,689																				
		b. Schedule and updates	32	\$8,900	\$16	\$3,689																				
		c. Bi-monthly progress meetings	108	\$23,289	\$32	\$7,378																				
		d. Monthly progress reports	12	\$2,588	\$0																					
		Subtotal	184	\$39,678	\$84	\$14,756	0	\$0	\$258	\$39,987	0	\$0														
Task 01	Easements/ Private Property Coordination	a. Mailing	2	\$431	\$0																					
		b. Access permissions	2	\$431	\$0																					
		c. Coordinate dye testing of sanitary fixtures	2	\$431	\$0																					
		d. Coordinate easement preparation (To be determined if necessary during design)	6	\$1,294	\$0																					
		Subtotal																								
Task 02	Physical Condition/Connectivity Verification/ Sewer Televiewing	a. Coordinate sanitary manhole inspections and review DVDs	2	\$431	\$0																					
		b. Coordinate televising existing sewers	14	\$3,019	\$0																					
		Subtotal																								
		a. Coordinate topographical survey and buried utility survey (LMT)	4	\$863	\$0																					
		b. delineate environmentally sensitive areas (forest, wetlands, flood zones, fish and wildlife study)	4	\$863	\$0																					
Task 03	Land Survey	c. Historical/archaeological site review/investigation	4	\$863	\$0																					
		d. Coordinate contaminated site review and environmental sampling	10	\$2,155	\$0																					
		Subtotal																								
		a. Geotechnical & Tunnel Engineering Plan	2	\$431	\$0																					
		b. Preliminary geotechnical assessment (seismic refraction study)	2	\$431	\$0																					
Task 04	Geotechnical & Tunnel Engineering	c. Management and oversight of geotechnical investigation, including field oversight of boring investigation.	2	\$431	\$0																					
		d. Laboratory testing	2	\$431	\$0																					
		e. Supplemental investigation (test pits, additional borings, etc.)	2	\$431	\$0																					
		f. Geotechnical Data Report	4	\$863	\$0																					
		g. Geotechnical analysis and design of cut-and-cover and tunnel pipe segments	4	\$863	\$0																					
Task 05	Hydraulic Model	h. Geotechnical analysis and design for manholes and structures	4	\$863	\$0																					
		i. Geotechnical design memorandums	4	\$863	\$0																					
		j. Geotechnical Baseline Report for inclusion in bid documents	4	\$863	\$0																					
		k. Specifications and estimates relating to tunneling, linings, shafts, and open cut	2	\$431	\$0																					
		l. Geotechnical profile sheets	28	\$5,807	\$0																					
Task 06	Detailed Design Services	Subtotal																								
		a. Update existing hydraulic model	4	\$863	\$0																					
		Subtotal																								
		a. Civil engineering design	110	\$23,720	\$110	\$25,363	40	\$5,531	708	\$101,489	620	\$58,928														
		b. Phase 3 Basis of Design Report	4	\$863	\$0																					
Task 07	Construction Document Preparation	c. Private property service connections	8	\$1,845	\$0																					
		d. Storm drain modifications	4	\$863	\$0																					
		e. Utility coordination/conflict resolution	4	\$863	\$0																					
		f. Traffic Control Plan	7	\$1,508	\$0																					
		g. Traffic Control Plan	10	\$2,155	\$0																					
Task 07	Construction Document Preparation	h. Permits and approvals	24	\$5,175	\$0																					
		Subtotal	175	\$37,737	\$142	\$32,741	40	\$5,531	1056	\$151,388	1142	\$108,353	24	\$2,258	2579	\$338,009										
		a. Drawings	80	\$17,251	\$80	\$18,448	40	\$5,531	240	\$34,406	320	\$30,352	640	\$50,237	1400	\$66,232										

ENGINEERING DESIGN SERVICES	Project Manager		Senior Engineering Specialist		Construction Specialist		Senior Engineer		Engineer		CADD		Total	
	Hours	\$/hr	Hours	\$/hr	Hours	\$/hr	Hours	\$/hr	Hours	\$/hr	Hours	\$/hr	Hours	Cost
a. Cost estimate	215.64	\$20.67	230.67	\$20.67	138.27	\$20.67	143.36	\$20.67	94.88	\$20.67	94.12	\$20.67	168	\$3,476.91
b. Specifications and front-end documents	24	\$5,175	24	\$5,175	40	\$5,175	40	\$5,175	24	\$5,175	24	\$5,175	182	\$939,960
c. Subtotal	24	\$27,602	128	\$27,602	120	\$27,602	360	\$27,602	384	\$27,602	640	\$27,602	1,760	\$2,211,968
Task 08: QA/QC and Constructability/Bid Reviews (including Constructability/Bid Reviews)														
a. QA/QC and constructability/bid reviews	120	\$25,877	40	\$25,877	80	\$25,877	40	\$25,877	0	\$25,877	0	\$25,877	280	\$51,896
Subtotal	120	\$25,877	40	\$25,877	80	\$25,877	40	\$25,877	0	\$25,877	0	\$25,877	280	\$51,896
Task 09: PRELIMINARY MEETING AND BID REVIEW														
a. Respond to contractor requests for information/pre-bid meeting and bid review	16	\$3,450	8	\$3,450	24	\$3,450	40	\$3,450	0	\$3,450	0	\$3,450	88	\$14,348
Subtotal	16	\$3,450	8	\$3,450	24	\$3,450	40	\$3,450	0	\$3,450	0	\$3,450	88	\$14,348
Task 10: PUBLIC/REGULATORY OUTREACH														
a. At the direction of NCC, no public meetings are planned for this project. Therefore, all hours for this task have been removed.	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
Subtotal	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
<b>TOTAL ENGINEERING DESIGN SERVICES</b>	<b>883</b>	<b>\$147,232</b>	<b>602</b>	<b>\$147,232</b>	<b>264</b>	<b>\$147,232</b>	<b>2670</b>	<b>\$147,232</b>	<b>3178</b>	<b>\$147,232</b>	<b>1144</b>	<b>\$147,232</b>	<b>4641</b>	<b>\$1,114,552</b>

<b>SUBCONSULTANTS</b>														
Task 01: Delineation (CES)														
a. Sanitary service lateral dye testing														\$4,725
Task 02: Sewer Telemetry Profiling (CES)														\$15,000
a. Sewer telemetry														
Task 03: Surveying (JMT)														
a. Topographical and utility survey and survey stakeout for soil borings. (Does not include easement survey)														\$200,000
Task 04: Manhole Inspections (CES)														
a. Sanitary manhole inspection for invert elevations and connectivity														\$22,175
Task 05: Geotechnical Survey (Environmental or other subcontractor)														\$32,000
a. Geotechnical investigation (soil borings)														
Task 06: Geotechnical Investigation (TRG)														\$170,000
a. Soil borings and lab testing														\$60,000
b. Test pits, supplemental borings, or other investigation														\$35,000
c. Contaminated site review and sampling														\$64,900
<b>TOTAL SUBCONSULTANTS</b>														

<b>VENDORS</b>														
Task 07: Final Design and Constructability Review (Michael Baker)														
a. 30% design review														\$2,000
b. 60% design review														\$2,000
c. 90% design review														\$3,000
<b>TOTAL VENDORS</b>														\$7,000

<b>RAILROAD OCCUPANCY PERMIT FOR PIPELINE</b>														\$60,000
---	--	--	--	--	--	--	--	--	--	--	--	--	--	----------

<b>CONTINGENCY FOR DESIGN</b>														\$100,000
-------------------------------	--	--	--	--	--	--	--	--	--	--	--	--	--	-----------

<b>GRAND TOTAL</b>														\$1,846,662
--------------------	--	--	--	--	--	--	--	--	--	--	--	--	--	-------------

